ADAIR'S NEW ENCYCLOPEDIA

THE JUNGFRAU

A magnificent peak of the Bernese Alps. This distant view gives to the mountain an added charm showing as it does its majestic girth and height.

ADAIR'S NEW ENCYCLOPEDIA

COMPLETE — CONCISE

A New and Up-to-date Reference Work

FOR

HOME, SCHOOL and OFFICE

IN FIVE VOLUMES
WITH FIFTY FULL PAGE MAPS

VOLUME FOUR

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MANNING, HENRY EDWARD (1808-92), Eng. cardinal, 1875; *s.* of a merchant; ed. at Harrow and Oxford; Fellow of Merton Coll., and ordained, 1832; *m.* 1833; widower, 1837; a parish clergyman from 1833; supported Tractarian movement and won name for eloquence; resigned; was received into R. C. Church, 1851, soon after ordained, and spent some time in Rome. In 1857 he went to Bayswater and founded Congregation of Oblates of St. Charles Borromeo; made abp. of Westminster, 1865. M. now led the Ultra-montanists in England, and urged on the definition of papal infallibility at the Vatican Council of 1870; wrote several devotional works.

MANNING, WILLIAM THOMAS (1866), a Protestant-Episcopal bishop. He graduated from the University of the South, in 1893, was for a while rector in Redlands, Cal., then, in 1893, became professor of dogmatic theology in the University of the South. During 1903-04 he was vicar of St. Agnew's Chapel, in New York City, was assistant rector during 1904-08, then rector of Trinity Parish, until 1921, when he was consecrated bishop of New York. During 1922-23 he was in the public eye on account of his controversy with the Rev. Percy Stickney Grant over the radicalism of the latter.

MANNY, SIR WALTER DE MANNY, BARON DE (*d.* 1372), founder of the Charterhouse. In 1349 he had bought land at Smithfield used as a burying-ground during the scourge of the Black Death. Here he founded a Carthusian monastery called *La Salutation Mere Dieu.*

MANNYNG, ROBERT, ROBERT OF BRUNNE (*c.* 1264-1340?), Eng. poet; chiefly remembered for long poem, *Handlyng Synne,* consisting of metrical homilies enlivened by legends, romances, and anecdotes; also author of chronicle entitled *The Story of Inglande.*

MANOEL II. (1889), ex-King of Portugal, son of King Carlos I. and Queen Mary Amélie; succeeded to throne on assassination of his father and elder brother, 1908. After a short revolution, Oct., 1910, the king was deposed and a republic was proclaimed. With the queen-mother he took refuge in England. Married Princess Augustine Victoria of Hohenzollern, 1913.

MANŒUVRES.—This term is applied in strategy and tactics to the movement of bodies of troops in a theater of operations for the purpose of bringing an enemy to battle or of defeating him in battle; but the term is also used to denote a form of military training in which modern armies engage in the summer months, when a force is divided and the two portions act against one another under rival leaders in accordance with a Scheme of Operations drawn up by the General Staff.

MANOR (Lat., *manerium*; Fr. *manior,* habitation), estate of land granted by sovereign to subject (usually some person of power and importance) in return for services to be performed. With the lordship of the m. were certain rights. The right to hold a court of one's tenants, and to exact fines by the judgment of such court, seem to be older than the charters of XI. cent. Purely civil powers exclusively were at first exercised by the m., but later criminal and penal jurisdiction was allowed. The court was in some respects the meeting of the village community with the lord of the m., or his officer as presiding judge. The tenantry of the m. were of two classes, villeins and cottars, the former compelled to give a certain amount of work to the lord of the m., the latter freemen in law, though freedom in Saxon England and in feudal times was a very relative state.

MANOR-HOUSE, the residence of the lord of the manor. The house was usually surrounded by a moat with a drawbridge as defense against disturbances on the estate.

MANRESA (44° 45′ N., 1° 47′ E.); town, on Cardoner, Barcelona, Spain; iron manufactures; textile industries. Pop. 25,000.

MANS, LE, a tn. of France, cap. of the dept. of Sarthe, 112 m. S. W. of Paris. It has a cathedral, originally founded by St. Julian, which contains the tomb of Berengaria, queen of Richard Cœur de Lion. The chief industries are the state manuf. of tobacco, the preparation of preserved vegetables, fish, etc., tanning, hemp-spinning, and the manuf. of coarse ironmongery, machines, watches, and clocks, stained-glass windows, railway carriages, and cloth. Pop. 69,361.

MANSARD (OR MANSART), FRANÇOIS (1598-1666), a French architect, *b.* at Paris. He made use of a peculiar kind of roof, which had been used 100 years before by Lescot, but which henceforth was called the Mansard roof. Among his buildings, the chief are the Chateau de Maisons-sur-Seine, and the churches of Sainte-Marie de Chaillot, the Minimes de la Place Royale, and the Visitation de Sainte-Marie in the Rue Saint-Antoine.

MANSFELD, ERNST, GRAF VON

(*c.* 1580-1626), Ger. mercenary soldier; famous as mercenary commander in Thirty Years' War; severely defeated by Wallenstein at *Dessau*, 1626.

MANSFIELD (53° 9′ N., 1° 12′ W.), manufacturing town, Nottinghamshire, England; lace, machinery. Pop. 1921, 44,118.

MANSFIELD, a town of Massachusetts, in Bristol co., on the New York, New Haven and Hartford railroad. It is 20 miles northeast of Providence, R. I., and about 24 miles southwest of Boston. Its chief manufactures are cutlery, baskets, gold, shell and horn jewelry, stoves, straw hats, spindles and foundry products. The town has a handsome high school, excellent primary and public schools, a large public library, a bank and a weekly newspaper. Its water supply is good and its lighting system modern and complete. Pop. 1920, 6,255.

MANSFIELD, a city of Ohio, and county seat of Richland co., and the highest city of the State, standing 1,200 feet above the level of the sea. It is served by the Pennsylvania, the Baltimore and Ohio and the Erie railroads. The presence of large coal fields in the immediate vicinity and the fact that it is supplied with natural gas have contributed largely to its prosperity. It does a large jobbing trade in groceries and is a distributing center for agricultural products. Its chief industrial establishments are employed in the manufacture of mattresses, rubber goods, automobile tires, agricultural implements, house furnishings and women's clothing. There are many fine buildings, including the Municipal Library, an opera house, Y. M. C. A. building, Children's Home and Ohio State Reformatory. There are 27 churches, many public, primary and high schools, eight banks and two newspapers. Pop. 27,824.

MANSFIELD, RICHARD (1857-1907), American actor; *b.* Heligoland. His mother was a singer, and with her he visited the United States while she was fulfilling engagements here. On his return to England, he studied for the East Indian Civil Service; later tried business, literature and art, in none of which did he achieve success. He found his true meter only when he entered the theatrical profession, playing at first in Gilbert and Sullivan's comic operas. In 1878 he appeared in New York as *Dromez* in the comic opera *Les Manteaux Noirs*, but it was only when *A Parisian Romance* was produced in Boston in 1883 that he produced a real sensation by his superb acting as *Baron Chevrial*. He augmented his reputation in 1886 by his work in the title role of *Prince Karl*, and two years later achieved a tremendous success in *Dr. Jekyll and Mr. Hyde*. Other notable roles were those of *Arthur Dimmesdale* in a dramatization of Hawthorne's *Scarlet Letter*, *Beau Brummel*, *Tittlebat Titmouse* and *Cyrano de Bergerac*, 1898. His ability was great, his artistic standard high, and his productions were marked by finish and extreme attention to detail.

MANSFIELD, WILLIAM MURRAY, 1ST EARL OF (1705-93), Eng. judge; called to Bar, 1730; supported government against Amer. colonies; Earl of M., 1776; house sacked and burned in Gordon riots, 1780; resigned office, 1788.

MANSURA (31° 4′ N., 31° 26′ E.); town, Lower Egypt, on Damietta branch of Nile; cotton and linen fabrics. Pop. *c.* 40,000.

MANTEGNA, ANDREA (1431-1506); Ital. painter; favorite pupil of Squarcione, the founder of the Paduan school, who adopted him. A precocious artist, he set up an atelier when only 17, and before leaving Padua about 1549 had executed several frescoes and altar-pieces for the churches there. The remainder of his life was spent at Mantua, where some of his greatest works were produced.

MANTELL, ROBERT (1854), a Scottish-American actor; *b.* in Ayrshire, Scotland. He made his professional debut in Rochdale, England, as the *Sergeant* in *Ar-rah-na-Pogue*, in 1876. Two years later he came to this country and played juvenile roles with Mme. Modjeska, then returned to England where, for three years he supported Miss Wallis as her leading man. After that he returned again to the United States where he appeared with Fannie Davenport as *Loris Ippanhoff* in *Fedora*. Since then he has appeared at the head of his own companies in Shakespearian plays and *The Lady of Lyons*, *The Corsican Brothers*, *Monbars*, *The Dagger and Cross*, and others.

MANTEUFFEL, EDWIN, FREIHERR VON (1809-85), Ger. general; app. gov. of Schleswig, 1864; occupied Holstein, 1866; commanded 'Army of the Main' in Seven Weeks' War; field-marshal in Franco-Ger. War.

MANTINEIA, MANTINEA (37° 37′ N., 22° 23′ E.), Arcadian city, ancient Greece; scene of two famous battles—in 418 B. C., when Agis II. of Sparta defeated Argives and Athenians, and in 362 B. C., when the Thebans under Epaminondas defeated the Spartans

and their allies; site of temple built by Hadrian.

MANTIS FLIES (*Mantispidoe*), a family of Neuropterous insects, resembling, on account of their large prey-seizing fore-legs, the true Praying Insects (*Mantis*), from which they may be distinguished by their four, almost equal, netted wings.

MANTUA (45° 9′ N., 10° 47′ E.), Etruscan city, N. Italy; strongly fortified; contains beautiful church dedicated to St. Andrea, cathedral, several palaces; belonged to Gonzagas till 1708, when passed to Austria; taken by French, 1797; held by French, 1801-14, by Austrians, 1814-66, when finally ceded to Italy; Vergil's birthplace. Pop. 35,000.

MANUAL TRAINING, the use of handwork as a means of general education, first adopted by Finland and Sweden. The purpose of teaching handicrafts in schools is the training of a pupil's hand and eye, not so much to give him the needful manual skill to follow a given occupation, but to educate him to a knowledge of familiar industrial pursuits in simple terms suitable to the comprehension of children. While manual training sets in motion the exercise of judgment, accuracy and observation, and stirs interest in elementary handicraft work, educators draw a sharp distinction between it and the vocational education conducted in trade schools or in other institutions with manual courses designed to teach a trade. The adoption of manual training in American schools began with paper folding and cutting, basket-work, clay-modeling, wood-carving, etc., in the elementary grades, and advanced to high-school courses for girls in dressmaking, millinery, leather and art jewelry, and for boys in carpentry, pattern-making, forging, machine-shop, foundry, sheet-metal, printing and electric-wiring work. The high-school method is to stress handwork or shop-work as illustrating fundamental processes of industry rather than their utility or industrial significance. A growing emphasis has been placed on the value of drawing, a fundamental acquisition for an understanding of many handicrafts. Sweden made manual training an integral part of her educational system to counteract the effect of the decay of home industries and to safeguard the people's physical and moral health, and her methods have exercised a predominating influence on similar school work in other countries.

MANUEL I., COMNENUS (*c.* 1120-80), Byzantine emperor; attempted to restore power of East Rom. empire in Asia Minor, Greece, Italy, and along Danube; won brilliant successes at first, with no permanent result.

MANUEL DE MELLO, DOM FRANCISCO (1611?-66), Portug. author; *b.* Lisbon; led an adventurous life in youth in active service; during a period of exile in Brazil wrote the greater part of his masterpiece, *Apologos dialogaes.* Other noted works are *Obras morales* and *Cartas familiares.*

MANUFACTURES, AMERICAN. The development of manufacturing in the United States followed the railroad extensions built after the Civil War, and progressed coincidentally with the growth of agriculture and mining, for which an enormous field was opened in the new western regions tapped by transportation. The lumber, grain, fruit, wool, minerals and livestock regions of the Pacific, Northwest, and Southwest states, the areas for spring and winter wheat and corn in the Middle West, the cotton lands of the South, and the petroleum and coal of the North Atlantic States combined to furnish unexampled resources for industrial expansion that eventually made the United States rank as the world's foremost manufacturing country. In 1860, the value of domestic manufactures was $1,886,000,000; in 1919 it was $62,418,078,773

The chief manufacturing section generally is the region east of the Mississippi and north of Mason and Dixon's line and though there is a constant movement of industry further west, the Middle Atlantic States remain pre-eminent as the country's industrial heart. The location of plants is determined by the proximity and accessibility of raw products, costs of transport, water power facilities, situation of markets, and the labor supply. The resources of the West made that region the center of the slaughtering and meat-packing industry. The Lake States, where lumber and iron ore are abundant, developed the manufacture of agricultural implements there. The accessibility of coal and iron at a minimum outlay enabled a phenomenal growth of the iron and steel industry in Pennsylvania, Ohio and Illinois.

The manufactures of the United States in 1919 were conducted in 290,105 establishments which employed 9,096,372 wage earners, to whom was paid $10,533,400,340 in wages, had an aggregate capital of $44,558,593,771, and produced goods to the value of $62,418,078,773. The chief manufacturing states were New York, with 49,330 plants; Pennsylvania, 27,973 plants: Ohio, 16,125; Illinois, 18,593; Massachusetts, 11,906; California, 11,942; and Wisconsin with

10,393 plants. As classified by groups, the manufacture of food and kindred products was the most extensive industry, with 61,312 plants. Textiles and their products, with 28,552 plants, and iron and steel and their products with 20,120 plants, came next. Other outstanding industries were lumber and its manufactures, 39,955 plants; leather and its finished products, 6,397; paper and printing, 36,403; chemicals and allied products, 12,224; stone, clay and glass products, 12,529; metals and metal-products other than iron and steel, 10,667; tobacco manufactures, 10,291; and vehicles (including automobiles), 21,152 plants. Leading specific industries were those making automobiles, which in 1919 had an output worth $2,387,903,287; boots and shoes, $1,155,041,436; bread and other bakery products, $1,151,896,318; railroad car construction and repairs, $1,279,235,393; men's clothing, $1,162,985,633; women's clothing, $1,208,543,128; cotton goods, $2,125,272,193; flour-mill and grist-mill products, $2,052,434,385; foundry and machine shop products, $2,289,250,859; steel works and rolling mills, $2,828,902,376; lumber and timber products, $1,387,471,413; petroleum refining, $1,632,532,766; steel shipbuilding, $1,456,489,516; slaughtering and meat-packing, $4,246,290,614; and woolen and worsted goods, $1,065,434,072.

MANURES.—From the earliest times it has been recognized that the addition to the soil of such substances as wood ashes, ground bones, and especially of farmyard manure exercises a beneficial influence on the crops, and is essential for continued fertility. Only in the middle of the XIX. cent., however, did the researches of the Ger. chemist von Liebig and of other scientists explain the meaning of this fact. It was then shown that plants require a certain supply of the elements nitrogen, potassium, phosphorus, magnesium, calcium, and iron and that this supply can be utilized only in the form of mineral salts present in the soil. All these elements are normally present in the soil, and in the case of natural vegetation the supply is kept up by the plants dying and returning to the soil, and the mineral elements which they contain ultimately become available again for their successors. Nitrogen is an exception, because the decomposition of the plant compounds containing it give rise to a number of volatile compounds, including gaseous nitrogen, which escape with the atmosphere, and thus form a source of waste. The supply of nitrogen is, however, replenished by the activities of a number of soil bacteria which assimilate atmospheric nitrogen and convert it into available compounds. In the course of agriculture, however, the harvest is generally removed completely, and thus the compounds which it has abstracted from the soil are permanently lost.

MANURES, BONE. See BONE MANURES.

MANUSCRIPTS, GREEK, LATIN, MEDIÆVAL. See PALAEOGRAPHY.

MANUZIO, MANUTIUS, Ital. family of scholars and printers. Aldo (1450-1515) founded *Aldine Press* at Venice, 1490. He was a humanist, friend of Pico della Mirandola, and distinguished Gk. scholar, and his press (*Aldine Press*) was established for preservation and dissemination of classics; noted for beautiful type and accuracy. His *s.* Paolo (1512-74) was an infant at Aldo's death, and printing was carried on by Aldo's less competent *f.*-in-law and his sons; Paolo obtained his *f.*'s reputation and made a specialty of Latin classics; he established a press at Rome, 1561, and produced theological works. Paolo's *s.* Aldo the younger (1547-97) compiled books from childhood, and superintended Venice press; less brilliant than two first Aldi.

MANX. See MAN, ISLE OF.

MANZANILLO.—(1) (19° 3′ N., 104° 27′ W.) seaport town, Colima, Mexico; exports hides, coffee. (2) (20° 23′ N., 77° 3′ W.), seaport, Santiago, Cuba, on S. coast; exports tobacco, woods, sugar. Pop. *c.* 17,000.

MANZONI, ALESSANDRO FRANCESCO TOMMASO ANTONIO (1785-1873), Ital. poet and novelist; *b.* Milan; pub. his first tragedy, *Il Conte di Carmagnola*, 1819; his great novel, *I Promessi Sposi*, 1825.

MAORI, the aboriginal race of New Zealand; branch of the Malay family; vigorous and intelligent; brown in color, with thick lips and straight black hair. They live chiefly in the North Island, and were numbered at 55,000.

MAP, the delineation on a plane surface of some portion of a terrestrial or celestial sphere. Terrestrial maps dealing with the land, or with the land and water as a whole, are termed geographical maps, and those referring to water areas and coastal outlines are called hydrographical maps or charts, the last name being given to maps specially prepared for navigators. An exact representation of the earth, with every detail in true relative position and proportion, can be made only on a globe, for it is not possible by any process of

development to make a portion of a sphere coincide with a plane surface. For this reason map-makers are obliged to resort to some method of projection or approximate development. The chief projections are five in number; the orthographic, the stereographic, the globular, the conical, and Mercator's or the cylindrical. There are also many modifications of the five, the results of efforts to eliminate difficulties and defects.

Geographical maps are properly maps of the world in general or of very large regions, as opposed to topographical maps, which show a small area in great detail and on a large scale. Topographical maps are often made on a scale of one inch to a mile, and the maps of the Ordnance Survey of Great Britain are among the best examples of this type.

A map is of little use unless we know what relation it bears to the actual size of the earth, and this relation is indicated by a graduated linear scale, showing by its divisions the number of miles or other local measures of length, corresponding to any distance measured on the map. The relation to nature is also expressed in fractional form. In a Representative Fraction (R. F.) the numerator is always unity, the denominator the number of the same units on the earth's surface which correspond to one unit on the map—(*e.g.*), 1 inch to the mile is R. F. 1|63,360. The meridian of Greenwich has been almost universally adopted as the initial meridian, but foreign countries still generally use a local meridian in topographical maps. The most notable of these foreign meridians are those of Paris, Pulkova, Stockholm, Rome, Brussels, Madrid, and Ferro.

Contoured maps show height of the land, and hachures afford indication of comparative steepness of mountain slopes. If slope between the contours is steep the lines, or hachures, are drawn thick and close together; if tolerably level, the hachures are thin and farther apart. In layered maps the different planes are shown by colors—as, for instance, green for lowlands, brown for hills, and blue for the sea; and still further accuracy is obtained by the use of various shades of these colors. The desire to have an absolutely true representation of nature has led to the construction of relief maps, and provided that the scale of the maps is sufficiently large, and that the horizontal and vertical scales are identical, the results are remarkably accurate. The chief use of such maps is in the teaching of geography.

Maps are now constructed for many other purposes. Among the most important of these are geological maps, which have been brought to a remarkable state of perfection during comparatively recent years. Maps are also constructed to illustrate magnetic declination and dip, winds, ocean currents, rainfall, etc., and for historical, military, statistical, and other purposes.

Ptolemy (A. D. 126-61) made great advances in geography, and his teachings ultimately laid the foundation of modern map-making or *cartography*. In his great geographical work, which was the standard treatise until the discoveries of the 15th cent. showed its defects, he gives an estimate of the earth's size, fixes all places by latitude and longitude, and introduces an improved method of projection. There is little of interest in Roman map-making except the Peutingerian table, made about A. D. 230, showing the then known world from Britain to India, with the principal roads. During the Middle Ages no advance was made, and it was not until the 14th and 15th centuries that serious attempts at scientific cartography were made. The impulse received from the geographical discoveries of the 15th and 16th centuries, and from the introduction by Mercator of cylindrical projection, has led to the present perfection of the map. The development of the aeroplane and its common use have made it necessary to map air-routes, and this has been done for all the routes likely to be followed by the commercial or postal air-services. See GEOGRAPHY.

MAP, WALTER (*d. c.* 1209), Eng. churchman and writer; clerk of royal household to Henry II., and held various ecclesiastical appointments. It is much disputed how far M. was concerned in the authorship of the Arthurian romances.

MAPLE (*Acer campestris*), a small tree indigenous to Britain, which possesses opposite, palmately veined leaves, with blunted lobes. These often exhibit the sticky exudations known as honey dew, which are caused by the attacks of aphides. The fruit is winged and is known as a samare. The est known Eng. varieties are the sycamore and plane. The sugar m. is found in Canada and the eastern states of America; the average yield of a tree is 5 lb. of sugar a year.

MAPLEWOOD, a city of Missouri. Pop. 1920, 7,431.

MAR, JOHN ERSKINE, 6TH OR 11TH EARL OF (1675-1732), Scot. Jacobite; proclaimed Old Pretender king in 1715; commanded Jacobites in great

defeat of *Sheriffmuir*, then fled to France; attainted, 1716; intrigued for Pretender abroad till 1724, but pensioned by George I. (called 'Bobbing John,' as turn-coat).

MAR, EARLDOM OF, title drawn from ancient province of Mar, Aberdeenshire, Scotland; one of the seven earldoms of Scotland in XIII. cent.

MARABOUS. See under STORKS.

MARACAIBO.—(1) (9° 50′ N., 71° 30′ W.) lake Western Venezuela, communicating with Gulf of Venezuela. (2) (10° 38′ N., 71° 42′ W.) city, seaport. Zulia, Venezuela, on Lake Maracaibo; important commercial center; exports coffee, hides; shipbuilding yards; leather manufactures; seat of national coll.; formerly seat of Jesuits' coll. Pop. 50,000.

MARAGAH, MARAGHA (37° 21′ N., 46° 17′ E.), town, Azerbaijan, Persia; remains of a celebrated astronomical observatory. Pop. *c.* 15,500.

MARANHÃO (5° S., 45° W.), maritime state, Brazil, on Atlantic; mountainous in the S.; well-watered and fertile, yielding rice, cotton, sugar, tobacco; much of it occupied by forests; minerals include copper, gold. Pop. *c.* 565,000. Capital, Maranhão. Pop. 32,000.

MARASCHINO, a liquor, distilled from a small black variety of wild cherry found chiefly round Zara in Dalmatia and Corsica. An inferior variety is made in Germany.

MARASH (37° 37′ N., 36° 45′ E.), town, vilayet Aleppo, Asiatic Turkey, at foot of Mount Taurus; trade in Kurd carpets, embroideries; supposed to occupy site of an ancient Hittite city. Pop. 50,000.

MARASMUS, the wasting away of the flesh without fever or apparent disease.

MARAT, JEAN PAUL (1743-93), Fr. revolutionist leader; *b.* at Boudry, Switzerland; became distinguished physician; wrote *Philosophical Essay on Man*, and various scientific works; during Revolution edited *L'Ami du peuple*, which attacked many powerful public bodies; much persecuted; twice fled to London, 1790-92; sat in Commune, Aug., 1792; deputy for Paris in Convention; engaged in struggle with Girondins, 1793; tried at their instigation, but acquitted; his last triumph was overthrow of Girondins; M.'s career of blood ended in his assassination by Charlotte Corday.

MARATHON (38° 5′ N., 23° 59′ E.), plain, N. E. Attica, Greece, between Mount Pentelicus and the sea; celebrated as scene of victory of Miltiades over Persians, 490 B. C.; on it stood the village of Marathon. A soldier, carrying the glorious news, ran post-haste to Athens, over 20 miles away; hence long-distance road-races of about 25 miles are often called M. races.

MARAZION (50° 8′ N., 5° 28′ W.); watering-place on Mounts Bay, Cornwall, England; chief industry, market-gardening.

MARBLE, certain varieties of limestone, which take a brilliant polish; of various tints, and also pure white and black, variegated, and spotted. Used for ornamental purposes, decorative and statuary work. Marble is pure calcium carbonate, and is generally divided into seven classes: m. of uniform color, as white or black; variegated with spots or veins; shell m., partly made up of shells; lumachella, wholly made up of shells; cipolino m., veined with green talc; breccia m., angular fragments of m. united by cement of different color to the fragments; pudding-stone m., same as above, but rounded fragments. Parian m., which has a waxy appearance, was used for most of the Grecian sculptures, as the Venus de Medici. The Parthenon was built of Pentelicus m., which was white and fine-grained. Carrara m. is generally used nowadays for fine sculpture work, and is obtained from quarries of that name in Italy. Colored marbles were known to the ancients as Rosso antiquo, a deep red stone with small white dots; Giallo antiquo, a m. of deep yellow; Nero antiquo, deep black m.

MARBLEHEAD, a town of Massachussets, in Essex co., on the Boston and Maine Railroad and on Massachusetts Bay. It was first settled in 1629 and until 1649 was a part of the town of Salem. It has an excellent harbor which has made the place the headquarters of devotees of yachting and fishing. Its chief industry is the manufacture of boots and shoes. It is one of the few places where the town meeting form of government persists. There are excellent waterworks municipally owned, good churches, schools, 2 banks, library, art gallery and a newspaper. There are many places of historical interest bearing on the Colonial and Revolutionary epochs. Pop. 1920, 7,324.

MARBLES, children's game played from time immemorial; Rom. and Egyptian m's made first from marble chips, then of clay, glass, and agate; formerly played by all classes; usually played by placing several m's in ring, object being to shoot greatest number out; shooting m's known as 'alleys;'

another game consists in tumbling m's into series of holes. Most m's manufactured in Germany and U. S. A.

MARBURG.—(1) (50° 49′ N., 8° 46′ E.) town on Lahn, Hesse-Nassau, Prussia; chief objects of interest are Gothic church of St. Elizabeth, and univ., 1527; pottery, leather, iron goods. Pop. 25,000. Colloquy of Marburg took place in 1529, to heal divisions of Ger. Protestants which had arisen specially about the Lord's Supper. Articles were drawn up and signed, and though permanent union was not effected, certain common principles were defined. (2) (46° 34′ N., 15° 39′ E.) town, Styria, Austria, on Drave; cathedral; leather manufactures; wine. Pop. 30,000.

MARCA, PIERRE DE (1594-1662), abp. of Paris; pub. *De Concordia sacerdotii et imperii*, under patronage of Richelieu, 1641, setting forth liberties of Gallican Church; pope refused to send bulls for his appointment to see of Conserans till he retracted, 1648; historical and ecclesiastical writings highly estimated.

MARCANTONIO (*c.* 1489-1534), Ital. engraver; *b.* Bologna. His first notable engravings were from plates of Albrecht Dürer.

MARCASITE, an iron ore; variety of pyrites, which it resembles in appearance; pale yellow in color with metallic lustre.

MARCEAU, DESGRAVIERS, FRANÇOIS SÉVERIN (1769-96), Fr. general; with Kléber won victories of *Le Mans* and *Savenay*; commanded in Belg. campaign, etc., 1794; campaign on Rhine and Lahr, 1725; slain during invasion of Germany, 1796; one of most famous of young commanders under Republic

MARCELLUS, MARCUS CLAUDIUS (*d.* 208 B. C.), hero of Rom. history; consul, 222, 214, 201, and 208; defeated Insubrians; prætor, 216; defeated Hannibal at *Nola*; took Syracuse, 212.

MARCH, the first month of the Roman year, and the third according to our present calendar, consists of 31 days. It was considered as the first month of the year in England until the change of style in 1752, and the legal year was reckoned from the 25th March. The Anglo-Saxons called it *Hlyd monath*, stormy month, and *Hraed monath*, rugged month. There is a proverb which represents M. as borrowing three days from April.

MARCH. The progress by a foot soldier at drill is known as marching in slow, quick, or double-quick time, whereby a certain number of paces of a certain length are taken in a minute. The word is also used to designate a day's journey made by troops with their impedimenta.

MARCH, FRANCIS ANDREW (1825-1911) an American philologist, *b.* in Millbury, Mass. He practiced law for several years and in 1858 was appointed professor of comparative philology at Lafayette College. He was president of the Spelling Reform Association for many years. He was one of the most notable of American philologists.

MARCH, PEYTON CONWAY (1864), American army officer; *b.* Easton, Pa. He graduated at Lafayette College, 1884, and from the United States Military Academy in 1888. In the latter year he entered the army in the artillery branch. He saw service in the Philippines both in military operations and later as administrator. He was a member of the U. S. General Staff, 1903-07, and served as an observer in the Russo-Japanese War, 1904. In the World War he was commander of the artillery branch of the A. E. F.; was appointed acting chief of staff March 4, 1918, and made general and chief of staff, May 20, 1918, holding that position throughout the rest of the war. He was awarded the Distinguished Service Medal in 1918 for 'exceptionally meritorious and distinguished services.' He has received decorations from England, France and many other European countries.

MARCHE, LA MARCHE (46° 5′ N., 1° 40′ E.), ancient province, France; capital, Guéret; corresponded to modern department Creuse and parts of Haute-Vienne and Indre.

MARCHENA (37° 19′ N., 5° 25′ W.), town, Seville, Spain· sulphur springs. Pop. 12,600.

MARCHES, THE (43° 25′ N., 13° 10′ E.), district, Italy, comprising provinces of Ancona, Ascoli-Piceno, Macerata, and Pesaro-e-Urbino; produces wine, tobacco, corn; became part of kingdom of Italy in 1840. Pop. 1,100,000.

MARCION AND MARCIONITES.—Marcion came to Rome about 140 A. D., and died about 20 years later, after establishing many churches. Marcion is sometimes called a Gnostic, hardly accurately. He 'edited' St. Luke's Gospel, and thought Paul alone understood Christ.

MARCO POLO. See POLO, MARCO.

MARCONI, GUGLIELMO (1874), Ital. scientist: inventor of a system of

wireless telegraphy; educated at Bologna, where he experimented; established wireless communication between England and France, 1899, and between Canada and England, 1902. Invented persistent-wave system, 1906; established public wireless service between Britain and America, 1907; his company has developed wireless telephony; received Nobel Physics Prize, 1909.

MARCOU, JULES (1824-98), a Fr. geologist. During work in the Jura Mountains in Switzerland he became acquainted with Louis Agassiz, who invited him to the United States and whom he assisted on his survey of the Lake Superior region in 1848. In 1861 he became connected with the Museum of Comparative Zoology at Cambridge, and was also in the service of the United States Government. He was the first geologist to cross the American continent.

MARCUS AURELIUS ANTONINUS (121-180), Rom. emperor and Stoic; *b.* at Rome; original name *Marcus Annius Verus*; adopted by his uncle, Antoninus Pius, emperor; ed. by Stoic teachers; consul, 140. On death of Antoninus, 161, he became emperor, with Verus as colleague; reign marked by various disasters—flood, famine, earthquakes, plagues, insurrections; Parthian War concluded, 165; waged war in person against barbarians in Aquileia, Pannonia and Noricum; subdued Marcomanni tribe, 168, 169; defeated Quadi, 174, and other Ger. tribes; subsequently marched to Germany; put down insurrections in various provinces; pacified Syria; returned to Rome via Athens, 176; had *triumph* for Ger. victories; again warred against Ger. tribes, 178, but died during campaign either from illness or poison; has been blamed for share in persecution of Christians, 177; opposed to Christianity. He wrote celebrated *Reflections* (*Meditations*), work of Stoic philosophy.

MARCY, WILLIAM LEARNED (1786-1857), Amer. politician; comptroller of New York State, 1823; senator, 1831; gov. of New York, 1832-38; secured bank reforms; War Sec., 1845-49; Sec. of State, 1853-57; instrumental in forming Gadsden Treaty, 1853; settled Koszta affair, and Brit. fisheries question; arranged reciprocity treaty with Canada; retired, 1857.

MARDI GRAS, literally 'fat Tuesday', the last day before Lent. In France and in New Orleans and other southern cities it is observed by carnival, which includes processions and other ceremonies.

MARDIN (37° 16′ N., 40° 44′ E.), town, Diarbekir, Asiatic Turkey. Pop. 26,000.

MARDUK, MERODACH, guardian deity of Babylon, was originally a sun-god; gradually he absorbed the attributes of the more ancient Babylonian deities Ea and Bel, and also assumed the powers of the minor gods of the Pantheon, till he practically became the only recognized deity.

MARE ISLAND, a naval station of the U. S. Navy, in San Pablo Bay, 28 miles north of San Francisco, Cal., near the town of Vallejo. It is two miles long and is fitted out with dry-docks, ordnance yards, marine barracks, a naval hospital, a training school, repair shops and an observatory.

MAREMMA (42° 20′ N., 11° E.), marshy region, on coast of Tuscany, Italy, extending from Orbetello to mouth of Cecino.

MARENGO (44° 53′ N., 8° 39′ E.), village, N. Italy, near Alessandria; scene of strenuously contested battle on June 14, 1800, when the French under Napoleon and Desaix defeated Austrians under Melas.

MARET, HUGUES-BERNARD, DUC DE BASSANO (1763-1839), Fr. statesman; moderate under Republic; aided Napoleon in *coup d'etat*, 1799, and became private sec. and Sec. of State; edited State journal, *Moniteur Universel*, 1800; noted for devotion to Napoleon; cr. peer under Louis Philippe.

MARGARET (1353-1412), queen of Denmark, Norway, and Sweden; *dau.* of Valdemar IV. of Denmark; *m.* Haakon VI. of Norway, 1363; app. regent of Denmark for her infant *s.*, Olaf, 1375, and in 1380 regent of Norway on her husband's death; nominated her young nephew Eric of Pomerania king of the three kingdoms, but herself wielded the power; called 'Semiramis of North.'

MARGARET (1489-1541), queen of Scotland; *dau.* of Henry VII. of England; *m.* James IV. of Scotland, 1503; James IV. was slain, 1513, and M. became sole guardian of their *s.*, James V.

MARGARET (1221-95), *dau.* of Raymond Berengar V. of Provence; *m.* Louis IX. of France, 1234.

MARGARET OF ANJOU (1430-82), queen of England; *dau.* of 'Good King René' of Anjou; *m.* Henry VI. of England, 1445; strove with Duke of York for chief power during Henry's madness, and led Lancastrians against Yorkists in Wars of Roses.

MARGARET OF AUSTRIA (1480-1530), *dau.* of Emperor Maximilian I.; *m.* (1) John of Castile, 1497; (2) Philibert II. of Savoy, 1501; she was regent of Netherlands from 1507.

MARGARET OF NAVARRE, MARGUERITE D'ANGOULEME (1492-1549), *m.* Charles, Duc d'Alençon, and later Henri d'Albret, king of Navarre; encouraged lit.; wrote *Heptameron* (tales modeled on Boccaccio), *Letters*, and *Marguerites* (poems).

MARGARET OF VALOIS (1553-1615), *dau.* of Henri II. and Catherine de Medici; *m.* Henry of Navarre; marriage dissolved after his accession to Fr. throne as Henri IV.; wrote *Memoires*.

MARGARET, ST., according to tradition was *dau.* of pagan priest at Antioch; embraced Christianity; refused marriage with potentate, was tortured and martyred; in Gk. Church she is called Marina, perhaps identical with St. Pelagia.

MARGARINE, OLEO-MARGARINE, OR BUTTERINE, substitute for butter, first manufactured 1870 by Mège-Mouriès. It is made from fats, oils, and milk. Ninety per cent. of the present output is prepared from the vegetable oils—cotton-seed oil, palm-kernel oil, coconut oil, etc.; but in the more expensive varieties animal fats and oils, expressed from melted best beef fat, are employed. Many animal and vegetable oils combine with hydrogen in the presence of nickel as catalyst, and are converted into fats, solid at ordinary temperature. These are termed 'hardened oils,' and are also employed in the industry. In the preparation of margarine, milk, skimmed or separated (the cream being used for butter making), is sterilized by pasteurization, cooled to 10° C., and inoculated with lactic acid bacilli, which causes it to sour. It is then churned with the melted mixture of fats and oils until emulsification is satisfactory, solidified by cooling, allowed to mature, and finally mixed with salt, coloring matter, flavoring materials, and preservatives. The use of vegetable oils and fats, which contain no vitamines, has been criticized in respect to the food value of margarine.

MARGARITA ISLAND (11° N., 64° W.), mountainous island, belonging to Venezuela, Caribbean Sea, N. of Cumana; length, 45 miles; capital Asuncion; formerly important pearl fisheries; discovered by Columbus, 1498. Pop. 42,000.

MARGATE (51° 23′ N., 1° 23′ E.), seaport, watering-place, Isle of Thanet, Kent, England. Pop, 1921, 46,475.

MARGHILAN (40° 28′ N., 71° 43′ E.), town, Ferghana, Asiatic Russia; silk and woolen industries. Pop. 44,000.

MARGRAVE (Ger. *Markgraf*, count of the mark), formerly a governor entrusted with the care of a 'mark,' or frontier (margravate), who stood immediately under the king or emperor. Margravates existed as early as the time of Charlemagne. In the 12th century they became hereditary, and later a M. held the same rank as a prince of the empire.

MARGUERITTE, PAUL (1860), Fr. novelist; *s.* of Fr. general Margueritte, 1823-70, killed in Franco-Prussian War; early attained prominence in literature; collaborated with his brother Victor (1866), in a series of books under the title of *Une Epoque*, dealing with the events of 1870-71; they also wrote a history of the war of 1870-71.

MARIA THERESA (1717-80), archduchess of Austria, queen of Hungary and Bohemia, empress of Holy Rom. Empire; *dau.* of Emperor Charles VI.; *m.*, 1736, Francis of Lorraine (emperor, 1745); *m.* of Marie-Antoinette; succ. her *f.*, 1740, by virtue of Pragmatic Sanction; attacked by Prussia, Spain, and Bavaria, but won recognition in War of Austrian Succession; sought in vain to recover Silesia from Prussia in Seven Years' War.

MARIANNA, a city of Arkansas, in Lee co. It is on several important railroads and is the center of an important cotton growing region. Its industries include cottonseed and lumber plants, and a machine tool factory. It is on the L'Anguille river. Its public buildings include a handsome city hall and other buildings. Pop. 1920, 5,074.

MARIANNE ISLANDS, OR LADRONES, archipelago N. W. Pacific (16° N., 145° E.); comprise ten volcanic islands, four inhabited—viz., Agrigan, Anatahan, Alamagan, and Pagan; also four inhabited coral islands—viz., Guam, Rota, Tinian, and Saipan. Total area (excluding Guam) is *c.* 250 sq. m., and the pop. *c.* 2,700. Chief export, copra. Guam (with only town, Agaña) acquired by U. S. A. during Span.-American War; remainder were German, but were seized during World War, and mandate given to Japan.

MARIE, AMÉLIE THERESE (1782-1866), *dau.* of Ferdinand IV. of Naples; *m.* Louis Philippe, Duke of Orleans, afterwards Fr. king, 1809.

MARIE - ANTOINETTE (1755-93), queen of France; youngest *dau.* of Francis I., Emperor of Holy Rom.

Empire, and Maria Theresa; education neglected; *m.* Dauphin Louis, grandson of Louis XV., 1770, aged sixteen; marriage was unpopular in France; her lightness, extravagance, and unconventionality alienated people; said to have given a million yearly to favorites, chiefly Austrians; nicknamed 'The Austrian;' despised her husband; attacked by calumnies so widely believed that she was hissed at Opera; birth of Louis XVII., 1785; scandal of diamond necklace followed; led opposition to Revolution; sought to win Mirabeau and after his death determined to fly; led king to Varennes, 1791; brought back and tried to bring about foreign invasion; after popular attack on Tuileries, imprisoned in the Temple, 1792; execution of king, Jan, 1793; imprisonment of queen in Conciergerie; tried and guillotined, Oct., 16.

MARIE DE' MEDICI (1573-1642), wife of Henry IV. of France; regent after his assassination; on her *s.* Louis XIII.'s accession she was exiled, and her favorite Concini was murdered; she failed to stir up civil war against Louis, and went to live with Henrietta Maria, Charles I.'s queen.

MARIE GALANTE (15° 55′ N.; 61° 15′ W.), island, Fr. W. Indies, S. E. of Guadeloupe, of which it is dependency. Pop. 16,000.

MARIE LESZCZYNSKA (1703-68), *dau.* of Stanislas L., king of Poland; *m.* Louis XV. of France, 1725.

MARIE LOUISE (1791-1847), archduchess of Austria; second wife of Napoleon I.; *dau.* of Francis II., Emperor of Holy Rom. Empire (Francis I. of Austria); *m.* Napoleon, 1810, and app. regent by him, 1814; *m.* of Napoleon II.; fled to Austria on Napoleon's first abdication, and refused to return; awarded government of Parma, Piacenza, and Guastalla.

MARIE THÉRÈSE (1638-83), *dau.* of Philip IV. of Spain; *m.* Louis XIV. of France, 1660.

MARIENBAD (49° 58′ N.; 12° 43′ E.), watering-place, Bohemia, Austria; saline springs. Pop. 7,000.

MARIENBURG (54° 1′ N.; 19° E.), town, W. Prussia, Germany; the castle (founded 1274) was seat of Teutonic Knights from 1309 to 1457, when M. became a Polish possession; passed to Prussia in 1772; manufactures machinery, cottons, woolens. Pop. 15,000.

MARIENWERDER (53° 44′ N., 18° 54′ E.), town, W. Prussia, Germany; XIII.-cent. cathedral; iron foundries; sawmills. Pop. 14,000.

MARIETTA, a city of Georgia, in Cobb co. It is on the Louisville and Nashville railroad. Its industries include mills, foundries, marble works and paper factories. Its public buildings include a library, court-house and several educational institutions. There is a national cemetery within the city limits. Pop. 1920, 6,190.

MARIETTA, a city of Ohio, in Washington co., of which it is the county seat. It is on the Baltimore and Ohio, the Pennsylvania and Marietta, Columbus and Ohio railroads, and on the Ohio river, at the mouth of the Muskingum river. The city has an extensive commerce on the river and its industries include the manufacture of flour, cars, leather, carriages, boats, furniture, petroleum, etc. It is the seat of Marietta College. Nearby is a series of prehistoric mounds. Marietta was founded by General Rufus Putnam and a colony from New England, in 1788. Pop. 1920, 15,140.

MARIETTA COLLEGE, a co-educational institution in Marietta, Ohio, founded in 1835. It has departments of the arts, military science, the classics, etc. Its library has 76,000 volumes, exceptionally complete with historical works on the Northwest. In the fall of 1921 it had a student body of 324, the teaching staff numbering 24.

MARIETTE, AUGUSTE FERDINAND FRANÇOIS (1821-81), Fr. Egyptologist; devoted most of his life to archæological exploration in the Nile valley, and wrote and illustrated several vol's dealing chiefly with his explorations.

MARIGNANO, BATTLE OF, won by Francis I. over Swiss, Sept. 13-14, 1515. Francis invaded Italy, evading Swiss and crossing Alps, but was overtaken between Piacenza and Milan by Swiss with reinforcement of Milanese cavalry; one of most obstinately contested battles of history; success gave French Milan.

MARIGNOLLI, GIOVANNI DE (*b. c.* 1291), Ital. traveler; envoy of Benedict XII. to emperor of Cathay, traveling across Asia; leaving Peking, traveled through China, then to Madras, Java, back to Ceylon, across Persia to Avignon. Notes of travels in vol. ii., *Monumenta historiae bohemiae*, 1768.

MARIGNY, ENGUERRAND DE (1260-1315), Fr. chamberlain; became chief minister of Philip IV., 1304; heavy taxes and peace policy offended nobles, who had him hanged as sorcerer on accession of Louis X.

MARIGOLD, name of several plants; the ordinary Annual M., with orange flowers (*Calenda officinalis*), is double-

flowered, or single and unisexual; the African M. (*Tagetes erecta*), with more deeply colored flowers; flower-heads used in dyeing; all of *Compositae* order. Marsh M., 'Kingcups,' and in U. S. A. 'Cowslip' (*Caltha palustris*), like large buttercup with glossy golden petals, of *Ranunculaceae* order.

MARINE BOILERS. See BOILERS.

MARINE CORPS, UNITED STATES, an independent branch of the military service, usually under the control of the Navy Department. It is the oldest branch of the military service, dating from 1775. The force is trained and organized for duties on both land and sea. A marine, in fact, has become known as a 'handy man' by his adaptability to undertake any assignment or perform any work relating to either the army or the navy. When assigned to a naval vessel, a marine detachment is detailed as a gun division, and becomes part of a ship's fighting force. The corps also are used to police navy yards, radio stations and naval magazines in the United States or elsewhere. Marines are utilized for technical service in advanced base work, or as mobile organizations for supporting the fixed defense forces of advance bases. They are serviceable as landing parties with expeditionary troops, and generally as custodians of American interests abroad, as well as at home, in emergencies such as riots and insurrections. The Corps is headed by a Major General Commandant but has no regiments, companies or battalions. Before the United States entered the World War in 1917, its total strength was about 10,000, but by the time American troops were ready to attack German positions on the Western front in 1918 it had become expanded to an army corps itself, lacking only cavalry. Marines fought with conspicuous bravery in the battles of Belleau Wood, Chateau-Thierry and other points.

MARINE ENGINEERING is that branch of science which treats with the design, construction and operation of ships, both naval and mercantile and the various accessories appertaining thereto. This branch of engineering includes certain phases of Civil, Mechanical, Electrical and Military Engineering as well as Naval Architecture. The official organization of the marine engineers of the United States is the 'Society of Naval Architecture and Marine Engineers' which was organized under the laws of New York State, May 10, 1893. It has for its purpose the promotion of the art of commercial and naval shipbuildings. The Art of Shipbuilding is, of course, an ancient one, but it was not until considerable work had been done by the early scientists, on the subject of buoyancy, etc., that this knowledge was applied to the construction of ships. Mariners were loath to depend on a theoretically designed vessel; they preferred to adhere to the older designs which had been in use for centuries. Thus it was not until the 19th cent. that naval architecture was elevated to the rank of a science, and it was not until the advent of steel ships and steam propulsion that marine engineering became a recognized branch of the practical sciences.

The scope of marine engineering includes such items as:—material for the construction of ships and accessories; structural strength of the ships and their ability to withstand the dynamic effects of the motion of the vessel; buoyancy; stability (seaworthiness), consideration being given to tendency to roll, pitch and yaw; frictional resistance to motion, which includes eddy and wave making as well as skin friction; the design and proportioning of ships, naval as well as commercial; the design and construction of ship basins and wharves, dry-docks, shipways, etc.

MARINER'S COMPASS. See COMPASS.

MARINETTE, a city of Wisconsin, in Marinette co., of which it is the county seat. It is on the Chicago and Northwestern, the Wisconsin and Michigan, and the Chicago, Milwaukee and St. Paul railroads, and on Green Bay at the mouth of the Menominee river. Its industries include iron works, lumber mills and paper mills. The city has a hospital and a public library. Pop. 1920, 13,610.

MARINI, GIAMBATTISTA (1569-1625), Ital. poet; wrote epics and lyrics in a stilted, bombastic diction, hence term 'Marinism.' See ITALY (LITERATURE).

MARINO, SAN. See SAN MARINO.

MARINUS I., Pope, 882-84.—Marinus II., same as Martin III., Pope, 942-46.

MARION, a city of Illinois, in Williamson co. It is on the Illinois Central Railroad. It is the chief trade center for an extensive grain, tobacco and livestock region. Its industries include plants for the making of shoes, machinery and gloves. In the neighborhood are important coal mines. Pop. 1920, 9,582.

MARION, a city of Indiana, in Grant co., of which it is the county seat. It is on the Cleveland, Cincinnati, Chicago

and St. Louis, the Pittsburgh, Cincinnati, Chicago and St. Louis, the Toledo, St. Louis and Western, and the Chesapeake and Ohio railroads, and on the Mississinewa river. The industries include rolling mills, iron mills, and glass factories. The city is the seat of a normal college, a national home for disabled soldiers, and has a public library and other public buildings. Pop. 1920, 23,747.

MARION, a city of Iowa, in Linn co., of which it is the county seat. It is on the Chicago, Milwaukee and St. Paul railroad. Its industries include railway shops, flour mills, cigar factories, broom factories, etc. Pop. about 5,000.

MARION, a city of Ohio, in Marion co., of which it is the county seat. It is on the Cleveland, Cincinnati, Chicago and St. Louis, the Hocking Valley and Pennsylvania railroads. Its industries include the manufacture of carriages, steam engines, dredges, pianos, mattresses, etc. It is the seat of the Sawyer Sanitarium, St. Mary's School, and has a public library and other public buildings. Marion was the residence of President Harding up to the time he became President in 1921, and was his burial place in August, 1923. Pop. 1920, 27,891.

MARION, FRANCIS (1732-1795), American Revolutionary soldier; *b.* near Georgetown, S. C.; *d.* at Pond Bluff. In 1760-61 he was engaged in campaigns against the Cherokees; member of the South Carolina provincial congress, 1775, which adopted a Bill of Rights and voted money for troops. Marion was made captain, and assisted in the capture of Fort Johnson, Sept. 14, 1775; was promoted major for victory at Charleston, June 28, 1776. He made unsuccessful attacks on Savannah, 1779-80, was made brigadier-general, then forced to take to the swamps where he gathered together 'Marion's Brigade' a terror to British and Tories. Tarleton named him 'Swamp Fox.' With Colonel Henry Lee he captured Fort Watson, April 1, 1881, and commanded the first line in the battle of Eutaw Springs. He was state senator, 1782-1790, and member of the Constitutional Convention, 1790.

MARIONETTES, puppets representing characters and moved by means of cords and springs by a concealed player, who speaks all the parts. A survival of the entertainment is the Punch and Judy show.

MARITIME PROVINCE (54° N., 145° E.), province, Eastern Siberia, extending along Pacific from Korea to Arctic Ocean, and including Kamchatka and part of Sakhalin; area, 716,000 sq. miles; surface largely mountainous and forest-covered; chief rivers, Anadyr, Amur, and Usuri; climate severe; thinly populated, mainly by Russians, who fish hunt, and trade in furs; coal and gold found. Pop. 1,547,330. Capital, Vladivostok. See SIBERIA, FAR EASTERN REPUBLIC.

MARITIME PROVINCES, east coast provinces of Canada, viz., Nova Scotia, New Brunswick, and Prince Edward Is.

MARIUPOL (47° 6′ N., 37° 35′ E.); seaport, Ekaterinoslav, Russia, on Sea of Azov, at mouth of Kalmius; iron and leather goods. Pop. 50,000.

MARIUS, GAIUS (155-86 B. C.); Rom. general; plebian; rose in army under Scipio Africanus, and *m.* a patrician; distinguished in Jugurthine War, and became consul, 107; subdued Numidia as pro-consul; consul, 104-101; crushed Teutones and Cimbri, 102-101; great Triumph, 101; obtained command, already given to Sulla, against Mithradates; defeated and condemned to death by Sulla, but spared, and escaped; recovered Rome in Sulla's absence, 86, but died soon afterwards.

MARIVAUX, PIERRE CARLET DE CHAMBLAIN DE (1688-1763), Fr. author; introduced special style, called *Marivaudage*; his novels, especially *Marianne*, 1731-41, prized above his plays.

MARJORAM (*Origanum*), a genus of aromatic herbs. The leaves of sweet M. (*O majorana*) are used for seasoning. Oil of M. is used in farriery, and a dye is also obtained from the plant.

MARK, Ger. standard weight and coin; old Eng. and Scot. marks were nominally worth 13s. 4d. (1200 onwards).

MARK ANTONY. See ANTONIUS, MARCUS.

MARK, GOSPEL OF ST., second of Gospels, but by almost universal consent of present-day scholars earliest written—probably about 70 A. D.; shortest of four Gospels, and simplest, giving story from preaching of Baptist till Resurrection; original end is lost, 16^{9-20} being later addition; mostly narrative, with few discourses; traditionally and probably actually the work of John Mark, who derived much information from St. Peter; some think it influenced by Pauline theol.; known to Justin Martyr, *c.* 150, and from *c.* 200 universally accepted in Christian church.

MARK, ST., called sometimes John Mark; to his mother Mary's house St.,

Peter came (*Acts* 12[12]); accompanied St. Paul on his first missionary journey (12[25]), but left him at Perga, to grief and indignation of Paul, who refused to take him with them on next mission; Barnabas, however, accompanied M. to Cyprus; when Paul wrote *2 Timothy*, M. was reconciled to him (4[11]); traditional author of the Gospel; according to some, M. himself is young man of *Mark* 14[51-52].

MARKET (from Lat. *mercatus*, trade). This word is used either of the fixed place to which purchasers and retail merchants resort for purposes of buying and selling or of a body of people met together for commercial transactions, such as the sale of provisions, livestock, etc., exposed in public, often at a fixed time and place.

MARKHAM, SIR CLEMENTS ROBERT (1830-1916), Eng. traveler and geographer; entered navy, 1844; retired, 1852; took part in Franklin search expedition, 1850-51; was honorary secretary of the Royal Geographical Soc., 1863-88, and president, 1893-1905, and in these capacities instrumental in fitting out the Arctic expedition under Sir George Nares, 1874, and the National Antarctic expedition under Captain R. F. Scott, 1900-4; a voluminous writer, whose works include *Franklin's Footsteps*, 1852; *Cuzco and Lima*, 1856; *Threshold of the Unknown Regions*, 1874, and *Missions to Thibet*, 1877.

MARKHAM, EDWIN (1852), an American poet and writer; *b.* in Oregon City, Ore. He came to California at the age of five with his parents and during his boyhood herded cattle and worked in a blacksmith shop, later graduating from the San Jose Normal School. Until 1899 he was teacher and principal of public schools, when the publication of his poem, *The Man With the Hoe*, brought him national fame. Since then he has lived in the East, contributing to magazines and occasionally lecturing. He has also written, *Lincoln, and Other Poems*, 1901; *California the Wonderful*, 1914; and *The Man With the Hoe in the Making*; a series of magazine articles covering the whole problem of child labor, later published in book form under the title, *The Children in Bondage*.

MARKHAM, WILLIAM (1719-1807), abp. of York, 1777.

MARKIEWICZ, CONSTANCE, COUNTESS, Sinn Fein M.P. for St. Patrick's, Dublin, since 1918; *dau* of Sir. Henry Gore-Booth, Bart., of Sligo; *m.*, 1900, Count Casimir Markiewicz, a Polish artist; founded National Boy Scouts, 1910; was prominently associated with Larkin in 1913; led insurgents in St. Stephen's Green and inside Royal Coll. of Surgeons during the Sinn Fein rebellion, Easter, 1916; sentence of death commuted to penal servitude for life; afterwards released. She was active in the Anti-Free State campaign in 1922-23.

MARKIRCH (48° 15′ N., 7° 10′ E.); town, on Leber, Alsace, Germany; cotton and woolen manufactures. Pop. 12,000.

MARKO, KRALYEVICH (*d.* 1374), Serbian hero; many legends have grown up about him.

MARK TWAIN. See CLEMENS, SAMUEL L.

MARL, a clay consisting mainly of mixture of carbonate of lime. The term is also applied to various rocks and soils. M. is used as dressing for soils by farmers, and is generally of a soft, earthy nature, and white, grey, or brown in color. The *Red m's* belong to the Keuper division or Triassic period, and are many thousands of feet thick.

MARLBORO, a city of Massachusetts, in Middlesex co. It is on the New York, New Haven, and Hartford, and the Boston and Maine railroads, 30 miles west of Boston. Its industries include boot and shoe factories, automobile works, carriage factories and electrical supply works. The public buildings include a city hospital, public library, convent and a high school. Pop. 1920, 15,028.

MARLBOROUGH, JOHN CHURCHILL, 1ST DUKE OF (1650-1722), Eng. general; served with distinction under Turenne, 1672; *m.* Sarah Jennings, confidante of Princess Anne, 1678; gained victory for king at *Sedgemoor*, 1685; subsequently attached himself to William of Orange, who made him lieut-gen., Earl of M., and P. C.; distinguished in wars in Ireland and Low Countries, 1689-92; imprisoned for treason, 1692; was in communication with banished king concerning Brest affair, 1694; held many responsible positions under William. On Anne's accession M. became captain-gen. of army; commanded Brit. and Dutch armies in War of Span. Succession; captured Kaiserwerth, Venlo, and Liege, 1702; Duke of M., 1702; during second campaign, 1703, captured Bonn, Huy, Lemburg; won brilliant victories at *Blenheim*, 1704; *Ramilies*, 1706; *Oudenarde*, 1708; captured Lille, 1708; battle of *Malplaquet* was less decisive, 1709; M. was deprived of his commands by Tory ministry, 1712.

MARLITT, E. (1825-87), the pseudonym of Eugenie John, a German novelist. She was for a time on the operatic stage, but became deaf and retired. After 1863 she wrote many romances and novels, including *Die zwolf Apostel*, 1865; *Goldelse*; *Blaubart*; *Das Geheimnis der alten Mamsell*, 1868; *Thuringer Erzahlungen*, 1869; *Heideprinzesschen*, 1872; *Die zweite Frau*, 1874; *Im Schillingshof*, 1879. These all appeared in the journal *Die Gartenlaube*. Her *Gesammelten Romane und Novellen* appeared 1888-90.

MARLOWE, CHRISTOPHER (1564-93), Eng. dramatist; B.A. and M.A. of Cambridge; was possibly an actor, possibly a soldier; led a life of great irregularity and was killed in a brawl. He is the first great Eng. dramatist, and has been described as 'the matrix from which Shakespeare's plays evolved'. His best-known plays were *Tamburlaine the Great*, 1590; *Dr. Faustus*, 1604, which was greatly admired by and had no little influence on Goethe, *The Jew of Malta*, 1588, and *Edward* II., 1590. *Edward* II. is a play of sustained power worthy to rank with the best of Shakespeare's hist. plays.

MARLOWE, JULIA (SARAH FRANCES FROST) (1870), an American actress; *b.* in Cumberlandshire, England. She came to this country at the age of two with her parents, who settled in Kansas and later removed to Cincinnati, Ohio. She attended public school until the age of 12, when she joined a juvenile opera company which gave *Pinafore*, *The Chimes of Normandy* and other light operas. A year later she toured the West with a road show. For three years she remained off the stage to study in New York City. She made her debut in New York City in 'Ingomar' as Parthenia. In 1911 she married E. H. Sothern, with whom, during recent years, she has appeared in Shakesperian plays.

MARLY-LE-ROI (48° 51′ N., 2° 2′ E.), village, on Seine, Seine-et-Oise' France; formerly famous for royal castle built by Louis XIV.

MARMANDE (44° 30′ N., 0° 10′ E.), town, Lot-et-Garonne, France, on Garonne; woolen goods. Pop. 9700.

MARMONT, AUGUSTE FRÉDÉRIC LOUIS VIESSE DE (1774-1852), Fr. soldier; served under Napoleon in Peninsular War and later campaigns; betrayed Napoleon at Paris; 1814; cr. peer of France at Restoration; went into exile with Charles X.; an able general, but self-interested man.

MARMONTEL, JEAN FRANÇOIS (1723-99), Fr. author; protected by Voltaire; wrote several plays and novels, and contributed to the *Encyclopedie*; *Memoires* useful for literary history of time; much thought of as stylist.

MARMORA (40° 38′ N., 27° 35′ E.), island of Turkey, in Sea of Marmora; ancient *Proconnesus*; famous marble quarries.

MARMORA, SEA OF (40° 40′ N., 28° E.), between Europe and Asiatic Turkey, communicating with Black Sea by the Bosporus and with Ægean by the Dardanelles; ancient *Propontis*.

MARMOSETS, a family of Primates.

MARMOTS (*Marmota*), a genus of Rodents, the members of which are related to Squirrels, and are found in the colder portions of Old and New Worlds, where they live in large companies in underground burrows; hibernate in winter.

MARNE.—(1) Dep., France, part of old prov. of Champagne (cut by 49° N., 4° 15′ E.), bisected by riv. Marne; center, gently-rolling country; the rest, flat and monotonous; climate dry and sunny, well suited to the production of cereals and champagne; wine matured in cellars of Reims, Epernay, and Châlons (chief place of dep.). Before the World War the dep. had flourishing woolen industry (center at Reims), also tanneries, iron and copper foundries, breweries and potteries. Area, 3,167 sq. m.; pop. 436,300. (2) Riv., France, rising on plateau of Langres (Haute-Marne), flows N.W. and W. for 326 m. past Châlons, Epernay, and Meaux to join Seine on r. bk. at Charenton (48° 47′ N., 2° 25′ E.), 2 m. S.E. of Paris. Navigable to St. Dizier; lateral canal from Epernay to Vitry (where Marne-Rhine Canal strikes off to E.); continued thence beyond St. Dizier. Haute-Marne Canal starts at Donjeux, and connects navigation of the Marne with that of the Saône. Length, 326 m.

MARNE, BATTLES OF THE.—(1) *First Battle.*—On Sept. 1, 1914, during the retreat of the Allies from the Sambre-Meuse line, Joffre marked out a position on which he determined to make his final stand. The position selected was in Champagne, extending from the upper reaches of the Seine to the Argonne. This line, however, was never reached, as an opportunity of taking the offensive occurred earlier. On Sept. 4, all Joffre's available forces were well linked together along a line which roughly coincided with the valley of the Marne. The disposition of the Allied armies was then as follows: the 3rd Fr. Army (Sarrail) lay between the Upper

Meuse, below Verdun, westwards to Bar-le-Duc; the 4th Fr. Army (Langle de Cary) lay astride the Upper Marne looking N. across the plain towards Châlons; westward to Sezanne lay the 9th Fr. Army (Foch); still farther W. where the 5th Fr. Army (Franchet d'Esperey) and the Brit. force; on the extreme left, in front of Paris, was a new army, the 6th (Maunoury), which Gallieni strongly reinforced on the nights of Sept. 6-7 and 7-8 by conveying troops from Paris in 1,000 commandeered taxis. The enemy armies from E. to W. were as follows: 5th Army (Crown Prince), 4th Army (Duke of Württemberg), 3rd Army (von Hausen), 2nd Army (von Bülow), and 1st Army (von Kluck).

The vast engagement, which began on the morning of Sunday, Sept. 6, and lasted seven days, was really won on the extreme left, and was almost wholly due to the 5th Fr. Army and the Brit. forces.

(1) *Fighting on the Extreme Left. Sunday, Sept.* 6.—Maunoury's 6th Army N. of Marne, began attempt to turn the Ger. right rear, and reached Chambry, Barcy, and Marcilly, directly N. of Meaux. The British S. of the Marne moved rapidly N.E., sweeping through the cavalry which covered von Kluck's flank, and after several hours' fighting captured Coulommiers. Von Kluck drew back in N.E. direction, towards Chateau-Thierry, the three forward corps which were at grips with the Brit. and 5th Fr. Armies.

Monday, Sept. 7.—Maunoury made further progress towards the Ourcq. Later in the day, the 9th Ger. Cavalry Division withdrawn from the Brit. front, was brought back over the Marne; 7th Fr. Corps was dislodged from Acy by the Ger. 2nd Corps, and at nightfall its exposed left was threatened at Stavigny. Fighting continued through the night, the Ger. artillery being in great strength. The 5th Fr. Army reached the Grand Morin at La Ferté Gaucher. The rest of the Allied armies found the opposing forces too strong for an advance of so pronounced a character. At some points they moved forwards slightly; at others they were pressed back.

Tuesday, Sept. 8.—Maunoury's 6th Army fiercely assailed, the 7th Corp being forced back to Bouillancy and Villers-St. Genest. The 5th Fr. Army drove forward to Petit Morin, and the British made headway, but only against heavy opposition. The Germans were in a good position on the N. bank of the river at Le Trétoire, but the crossing of the river higher up by Brit. cavalry and the 1st Division enabled the enemy to be dislodged.

Wednesday, Sept. 9.—Crisis of the battle on Allied left. 6th Fr. Army in great difficulties. Von Kluck had strengthened his flank guard on the Ourcq by troops coming up by way of Compiègne; these thrown round N. end of the Fr. lines. The 4th Corps were hurried by Gallieni to the rescue, and the French stood firm until in the evening the Brit. advance brought relief. By about 10 in the morning the 1st and 2nd Brit. Corps had completed the passage of the Marne, and had advanced some miles to the N. of it, though the 3rd Corps did not cross till nightfall. 5th Army was held up in front of Verdun; the 6th Army in front of Nancy-Epinal; the 2nd Army was in retreat, its left wing being forced back and not retiring voluntarily. In consequence of these facts all the armies were to be moved back towards the Aisne. Orders were issued for retreat of 1st Army at 2 p.m., and probably for the other armies about the same time.

(2) *Fighting in the Center. Sept. 6-9.*—Foch's rôle was to cover the right of the 5th Fr. Army, and to prevent the enemy from issuing from the marshes of St. Gond. He was instructed to maintain the defensive until the first phase of the battle on the extreme left was announced. For three days he obstinately opposed the left wing of von Bülow and the right of von Hausen. Despite help sometimes from his right and sometimes from his left, he was beaten three days in succession. At the end of the third day he summed up the situation thus: 'My right is driven back; so is my left. I am pushing my center forward.'

(3) *Fighting on the Extreme Right.*—Between the opening of the battle and the beginning of the retirements ordered at 2 o'clock on Sept. 9, the Duke of Würtemberg had driven Langle de Cary out of Vitry and had pushed beyond that town, thus being farther south than his neighbors. When the retirement began, Langle de Cary immediately took the offensive, and was assisted by Foch, who flung a [illegible]y of troops eastwards over the Sezanne plateau against the flank of the Württemberg army. The crown prince, farther east, had reached Revigny on the riv. Ornain, 20 m. S. of Ste. Menehould, on the 6th. After a four days' battle, he began his retreat northward on the 10th. the last Ger. troops leaving Revigny on the 12th. Fort Tryon, which was on the point of falling, was relieved; but St. Mihiel fell, though the issue from it was blocked. The Germans held this salient for four years.

The retreat of the Germans was very skilfully conducted, and though their

losses in men and *materiel* were considerable, their armies were practically intact. By the evening of the 12th they were digging in on the Aisne heights, the finest natural defensive position in France. Nevertheless their retreat was fatal: the contemplated lightning stroke which was to bring France to its knees had been averted. In their burrows on the Aisne the Germans exchanged the offensive for the defensive, and gave the Allies time to build up their strength in men and munitions and to apply the restriction of sea-power. Though the war continued for over four years longer the First Battle of the Marne was the real beginning of the end.

II. *Second Battle.*—The great Ger. onset which began on March 21, 1918, extended from the Oise to Flanders. Though in its initial stages its success was terribly alarming, it had died out by April 29, on which day the Germans suffered heavy defeat in Flanders. Thereafter for nearly a month they made no attacks in force. On May 27, Ludendorff shifted his aim and struck a terrific blow on a forty-mile front from Coucy-le-Chateau to the Aisne-Marne Canal. (See WORLD WAR.) The French, vastly outnumbered, fell back, and the Germans advanced so rapidly that by May 30 they had captured La Fère-en-Tardenois. On the morning of Thursday, May 31, they appeared on the hills above the Marne from Chateau-Thierry to Dormans, and had thus created a narrow V-shaped pocket, its eastern front running N.E. in front of Reims, its western front lying along the highroad from Soissons to Chateau-Thierry. The advance had been forced to take this curious shape owing to the resistance made at Soissons and Reims.

The Germans now began to attack Chateau-Thierry. At this juncture the 2nd Amer. Division, with elements of the 3rd and 28th, together with Fr. colonial troops, were in billets S. of the town. They were at once called upon to defend the three-arched stone bridge which crosses th iver at this point. While the Amer. achine-gunners covered the bridge, the Fr. colonials made a dashing counter-attack and drove the enemy back. As, however, the town is cut in two by the river, it was decided to abandon the northern part. The Americans covered the withdrawal of the Fr. infantry with success.

On June 1, at 9 in the evening the Germans, having entered the northern part of the town, proceeded to cross the river; the stone bridge was blown up, but by means of pontoons certain forces gained the southern bank, and the situation was most critical. The Amer. machine-gunners, however, saved the day. In sheltered spots they commanded all the points of passage, and during forty-eight hours of grave anxiety stopped every further attempt to cross. On June 3, another attempt to cross was made at Jaulgonne, 8 m. N.E. of Chateau-Thierry; but thanks to the fine artillery work of the Allies, and especially to the machine-gunners of the Americans, it was foiled. This good work was repeated on June 5, and bettered during the next two days, when the Amer. 2nd Division and U.S. marines accomplished a substantial counter-stroke in which they took and held Veuilly-la-Poterie, Torcy, and Bouresches to the N.E. of Chateau-Thierry, thus securing the S.W. angle of the salient. On the 18th, Ludendorff attempted to envelop Reims, but his assaults both here and later near Bligny were repulsed. The Allies now began to press the enemy on both flanks, and his situation in the narrow pocket grew more and more precarious.

On July 15, Ludendorff began his final attempt to break through on a line extending from the Argonne to Chateau-Thierry. East of Reims, Gouraud prevented the 3rd Ger. Army from making an effective advance; von Boehm, who attacked between Reims and Chateau-Thierry, was held up against the Mount of Reims, but along the eleven miles of the Marne above Chateau-Thierry his right wing crossed the river, reached the crest of the hills on the S. side, and descended into the villages of St. Agnan and La Chapelle. During the next two days the Germans strove hard to extend their gains. On July 18, Foch launched a powerful counter-attack from Chateau-Thierry to the Aisne, with such success that the V was indented on the W. side from three to six miles, and more than twenty villages were recovered. This dramatic stroke won the Second Battle of the Marne. The all-important main road from Soissons to the Marne and to the eastern face of the salient was rendered impassable to the enemy on the 18th, and on the 19th the railway station at Soissons, through which every gun and shell had to pass from the Ger. bases into the salient, was under Fr. fire.

That night the Germans beyond the Marne began to retire, and by the 21st a correspondent could write, 'There is not a single German on the S. bank of the Marne, or rather not a living German.' On the same day the enemy was forced to evacuate Chateau-Thierry, and by the 25th, in spite of violent counter-attacks, he had been driven beyond the Ourcq. On Aug. 2, the French were back in Soissons, and be-

tween Aug. 3 and 4 the Allied line had swung up to the Vesle. With the retreat of the Germans across the Vesle the Second Battle of the Marne may be said to have ended. It is estimated that the Crown Prince flung into the fight 72 divisions: his losses in killed and wounded were very heavy; over 40,000 prisoners were captured, besides hundreds of guns and a vast amount of stores and ammunition.

MARNE-HAUTE, see HAUTE-MARNE.

MAROCCO. See MOROCCO.

MARONITES, Oriental Christian Church, in communion with Rome, but retaining Syriac liturgy and married clergy (though they no longer marry after ordination); its early history is obscure, and in XII. cent. it was heretical; now being increasingly Romanized; M's exist mostly around Lebanon, Hermon, and Antioch, and number about 500,000.

MAROONS, fugitive slaves who took refuge in W. Indies; M's of Jamaica were not conquered by British until end of XVIII. cent.; negroes of Surinam are descendants of M's.

MAROS - VASARHELY (46° 28′ N., 24° 31′ E.), town, on Maros, Transylvania, Hungary; chief town of the Szeklers; tobacco; wine and fruit. Pop. 1910, 25,517.

MAROT, CLÈMENT (1497-1544), Fr. poet; *s.* of Norman poet, Jean Marot, sec. to Anne of Brittany; obtained patronage of Marguerite d'Angoulême and good graces of François I., to whom he addressed his best *Epitres*, and with whom he was captured at Pavia, 1525. Suspected of Protestantism; twice imprisoned, and escaped with court aid; avenged himself by writing *L'Enfer* to describe prisons of the Châtelet; escaped to Italy, 1535, but returned, 1536; after his translation of *Psalms*, condemned by Sorbonne, fled to Geneva, 1543; driven forth by Calvinists, and died in Turin; left seventy *Epitres* addressed to influential people and friends, elegies, ballads, *rondeaux*, songs, about 300 epigrams, translations in verse of Vergil, Ovid, Petrarch, Erasmus; his *Psalms* had vogue among Protestants

MARQUE, LETTERS OF. See LETTERS OF MARQUE.

MARQUESAS ISLES, are properly speaking, the southern group of the Mendaña Archipelago in Polynesia, the northern group bearing the name of the Washington Is.; but the name is now applied to the whole archipelago. The M. I., in lat. 7° 30′ to 10° 30′ S., long. 138° to 140° 20′ W., were discovered by Mendâna de Neyra, a Spanish navigator, in 1595; the Washington Isles were discovered in 1791 by Ingraham, an American. The largest islands are Nukahiva (the seat of the French commissioner) and Hivaoa. The islands are of volcanic origin, and are mountainous, rising in some cases to over 3800 ft. above sea-level. In 1842, the M. I. submitted to the French, and now form a French protectorate. Total area, 480 sq. m. Pop. 3500, having decreased from 100,000 during the last century.

MARQUESS, MARQUIS (from O. Fr. *marchis*, a mark or frontier; elliptical form of *comes marchiae*, count of the march), Eng. title of peer, below duke and above earl; formerly ruler of a 'march.'

MARQUETTE, a city of Michigan in Marquette co., of which it is the county seat. It is on the Duluth, South Shore and Atlantic, and on other railroads, and on Lake Superior. There is an excellent harbor, with a 3,000 ft. breakwater built by the U.S. Government. The industries of the city, which are of great importance, include railroad and machine shops, flour and lumber mills, brick works, etc. It has also several of the largest iron ore docks in the world and is one of the chief centers for the shipping of iron ore. The public buildings include a U.S. Government building, Northern State Normal School, a public high school, a library and Upper Michigan Children's Home. Pop. 1920, 12,718.

MARQUETTE, JACQUES (1637-1675) a French explorer and missionary priest; *b.* in Layon, France. In 1666 he became a Jesuit priest and was sent to Canada as a missionary. He made, from 1673 to 1674, an extensive missionary journey through the Lake Superior and Green Bay region, preaching to the Indians and making notes of his explorations. He was one of the earliest voyagers down the Mississippi River. Of this journey he made an interesting and valuable account. He died near Marquette River, Mich., on May 18, 1675.

MARQUETTE UNIVERSITY, a Rom. Catholic institution of higher learning, founded as the St. Aloysius Academy in 1856 by the Jesuits, in Milwaukee, Wis. In 1907 it was established on its present status as a university. It has departments of arts and sciences, applied science and engineering, dentistry, law and economics, journalism, music, medicine, and a training school for nurses. During the term of 1921-2 it had a student body of 4,050, the faculty numbering 210. The library contains over 13,000 volumes.

MARRIAGE, the social and legal contract which binds together men and women for the purpose of rearing offspring. It is probably an older usage than the human race, arising from biological rather than social need, since the permanent union of male and female is found among animals, especially among birds. Where promiscuity has existed among certain tribes of savages, it has probably been a form of degeneration, invariably leading to its destruction. Within historic times marriage has taken on various forms, adapting itself to conditions, as in the case of polygamy, where the depletion of the males through the warfare has forced a stimulated birthrate for the preservation of the tribe or nation, or where, on the contrary, a scarcity of women has developed that rarer form of union, polandry. Monogamy, the permanent union of one man and one woman, however, is the normal form of marriage, leading to the higher states of civilization in which the family is the unit of social organization. This has become the form recognized by the law and the churches of the western nations, their virility being undoubtedly in proportion to the degree to which they have been loyal to the observance of this form of union. Within historic times we find various peoples abandoning polygamy for monogamy, as among the Hebrews. The same tendency has more recently manifested itself among the Turks, monogamy being accorded recognition as the legal form of marriage by the National Assembly in 1923, though already in practice among the majority of the people for at least a generation past. In industrial countries, such as England and the United States, economic conditions have been a handicap to the monogamous union, legal marriages being fewer during hard times and more numerous during periods of prosperity. The relatively increasing number of divorces in the United States, compared to marriages, has by many been considered a dangerous sign of the disintegration of the monogomous marriage, but it is probably only a more open manifestation of a permanent condition, due to the increasing liberality of the laws governing divorces. In 1916 marriages in the United States numbered 1,040,778 and divorces 108,702, compared to 483,069 marriages and 27,919 divorces, in 1887.

MARROW, the soft substance in the interior of bones.

MARRUVIUM (42° N.; 13° 45′ E.), formerly chief town of the Marsi, on Lacus Fucinus, Italy.

MARRYAT, FLORENCE (1837-1899), an English novelist; *b.* in Brighton, the *dau.* of Captain Frederick Marryat. In 1872 she became editor of London Society. She wrote many novels and a work entitled *There Is No Death*, dealing with spiritualism which had a wide vogue.

MARRYAT, FREDERICK (1792-1848), Eng. novelist and naval officer; *b.* Westminster; spent several adventurous years in service under Captain Cochrane; author of several well-known books of adventure, (*e.g.*) *Mr. Midshipman Easy*, *The Phantom Ship*, *Masterman Ready*, and *Children of the New Forest*.

MARS, fourth planet in order of distance from sun; mean distance, 141 million miles; period, 687 days; rotation period, 24 hours 37 minutes 22.67 seconds; two satellites, *Deimos* and *Phobos*, revolving in 7 hours 38 minutes and 30 hours 14 minutes respectively. Mars is the planet concerning which we know most, its orbit being outside that of the earth, so that its surface is fully illuminated when it is nearest us. In addition, its atmosphere is not too dense to hide materially its surface markings. Some of these markings are permanent features, others are variable. The planet's equator is inclined to its orbit at an agle of 24° 50′, and in consequence there are seasons, as on the earth. At the poles are white caps, which shrink in summer and grow again in winter, just as the earth's polar ice-caps shrink and grow. Evidences of the existence of cloud have been obtained, for at times portions of the disc are obscured. In 1877 Schiaparelli discovered a number of narrow straight dark lines on M., which have since been called 'canals.' Lowell, who has studied M. very thoroughly, believes these 'canals' to be of artificial origin, but it appears improbable that the planet is capable of supporting life. Its atmospheric pressure must be very small, for gravity is only 38% that of the earth, and the surface is easily seen. Again, the seasons are nearly twice as long as ours, and the inequality in length is far greater. Hence the mean summer and winter temperatures must differ greatly, and it must be remembered that M. receives only three-sevenths the amount of heat the earth receives from the sun.

MARS, an ancient Ital. god of war and identified with the Gk. Ares. Mars seems originally to have been a god of agriculture, worshiped primarily in the spring, and to whom first-fruits were dedicated. Mars was also worshiped as a war-god, and dedicated

to him were the Salii—dancing priests with clashing shields. In later times Mars was identified solely with war, and his associations with agriculture were forgotten.

MARSALA (37° 50′ N., 12° 25′ E.), seaport, Italy on west coast of Sicily; exports Marsala wine; Garibaldi landed here, 1860. Pop. *c.* 60,000.

MARSEILLAISE, Fr. national anthem; composed by Rouget de Lisle, an officer, 1792; sung by Marseilles contingent when entering Paris, hence name.

MARSEILLES, chief tn., Bouches-du-Rhône, France (43° 17′ N., 5° 22′ E.), on Mediterranean; second city and chief commercial port of France; built on four hills with background of mountains; old landlocked port overlooked by Notre-Dame de la Garde (1848-93); chief street La Cannebière; spacious modern docks; cathedral, Longchamp Palace, museum, Faculty of Science, etc.; fine coast scenery; Chateau d'If; port in normal times entered and cleared by 14,500,000 tons annually; headquarters of Fr. Messageries Maritimes and Fraissenet Steamship Co.; touched by lines to India and Australia; leading articles of trade: coal, oil-seeds, grain, soap, petroleum, wine; manufactures sugar, soda, metals, soap and candles, also refines oil; founded by Phocæans (*c.* 600 B.C.); besieged and captured by Cæsar (49 B.C.); under Romans famous for commerce and culture; semi-independent in Middle Ages; deprived of many privileges as free port by Louis XIV. (1660); ravaged by plague (1720). During the World War Marseilles was an important communication base; the first contingent of Indian troops to serve in France arrived (Sept. 25, 1914); and Allied troops and supplies proceeding to or coming from the East generally embarked or disembarked at this port. Pop. 550,600.

MARSH GAS. See Coal.

MARSH, GEORGE PERKINS (1801-82), Amer. lawyer, linguist and author.

MARSH, OTHNIEL CHARLES (1831-99), Amer. palæontologist, whose discoveries of Amer. fossil vertebrates—pterodactyls, birds, and mammals—have done much to strengthen the theories of evolution and natural selection.

MARSHAL (from O. Fr. *mareschal*, farrier, marshal), one of general appellations which became appropriated to titular officers of mediæval royal and princely households, and have obtained [illegible] technical meanings since. (*e.g.*:) army commanders, as in France, Germany, England, etc.

MARSHALL, a city of Missouri, in Saline co., of which it is the county seat. It is on the Chicago and Alton, and the Missouri and Pacific railroads. In the neighborhood are important coal mines. Its other industries include lumber and brick mills. It is the seat of Missouri, Valley College, a Catholic Academy and a State Institution for the Feeble-Minded. There is a public library and an opera house. Pop. 1920, 5,200.

MARSHALL, a city of Texas, in Harrison co., of which it is the county seat. It is on the Marshall and East Texas, and the Texas and Pacific railroads. Its industries include a foundry, railroad shops, cotton compresses, cotton gins, a pottery plant, furniture factory, etc. It is the seat of the College of Marshall and two colleges for colored people. Pop. 1920, 14,271.

MARSHALL ISLANDS (10° N., 170° E.), archipelago, Pacific Ocean, comprising two groups—Ralik in W., Ratak in E.; came under Ger. protection in 1885; chief product, copra.

MARSHALL, JOHN (1755 - 1835), Amer. chief justice and statesman; commanded in War of Independence; counsel in great case, *Hite vs. Fairfax*, 1786; one of commissioners to France, 1797-98, to settle questions in dispute; returned to national House of Representatives, 1799; Sec. of State, 1800-1; chief justice, 1801, and occupied important place in history of U.S.A. law and constitution. Of great learning and strong personality, he led Supreme Court and by many of his decisions strengthened Federalist cause; of great eloquence; author of *George Washington* valuable biography; *Constitutional Decisions* was published, 1905.

MARSHALL, THOMAS RILEY (1854), American legislator and executive; *b.* North Manchester, Ind. He graduated from Wabash College in 1873 and two years later was admitted to the bar, beginning practice at Columbia City, Indiana. He engaged actively in Democratic politics and in 1908 was elected governor of his state. In this position he showed qualities of independence and concern for the public welfare that attracted national attention. In 1912 he was nominated on the ticket with Woodrow Wilson as vice-president of the United States and was elected, being re-elected in 1916. As presiding officer of the Senate he was a general favorite because of his fairness, genial personality and homely philosophy.

MARSHALLTOWN, a city of Iowa, in Marshall co., of which it is the county seat. It is on the Chicago and Great Western, the Minneapolis and St. Louis, and the Chicago and Northwestern railroads. Its industries include a glucose factory, grain elevator, flour mills, meat packing plant, furniture factory, etc. It is the seat of the Iowa State Soldiers' Home. Pop. 1920, 15,731.

MARSHFIELD, a town of Wisconsin, in Wood co. It is on the Wisconsin Central Railroad. It is the center of an extensive agricultural district and its industries include a wood veneer factory, furniture factory, etc. Pop. 1920, 7,394.

MARSH GAS. Impure methane. The name arises from the fact that when the mud in a marshy swamp is stirred, bubbles of the gas are produced. It also occurs in natural gas, of which it forms about 90%, and is found in coal mines, where it sometimes exists under considerable pressure. In the process of mining the gas is liberated and frequently escapes with a hissing sound, called by the miner a 'blower,' or a 'singer,' while the gas itself is known as 'firedamp.' It appears to be a product of the putrefaction of vegetable matter, or cellulose, in the presence of water, and out of contact with air. It may be produced artificially by the action of a fungus on pure filter - paper. (See METHANE).

MARSH MALLOW (*Althoea*), genus of plants, order Malvaceæ; *A. officinalis*, growing near Brit. coasts, has pale blue flowers.

MARSI, ancient Ital. people of Sabellian race, who dwelt near Lake Fucinus; chief movers of celebrated *Marsic* or *Social War.*

MARSILIUS OF PADUA (1270-1342), Ital. scholar, who with the assistance of John of Jandun wrote the famous *Defensor Pacis*, a treatise in which the power of the people is defended against the supremacy of the Papacy—the work is, in fact, a precursor of the doctrines of the Fr. Revolution. The *Defensor Minor* was written by M. to explain some obscure points in his theory.

MARSIVAN, MERZIFUN (40° 50′ N., 35° 30′ E.), town, vilayet Sivas, Asia Minor; seat of Anatolia Coll.; cotton manufactures. Pop. 15,000.

MARS-LA-TOUR (49° 12′ N., 5° 53′ E.), village, Meurthe-et-Moselle, France. A great battle between French and Germans was fought in vicinity, Aug. 1870.

MARSTON, JOHN (*c.* 1575-1634), Eng. dramatist and satirist; ed. Oxford; gave up playwriting and entered the Church; works include *The Scourge of Villany, Antonio and Mellida, Antonio's Revenge, What You Will,* and *The Malcontent,* usually considered his masterpiece; plays have much passion but are full of horrors, blood, and bombast; satires, like his tragedies, are too extravagant.

MARSTON MOOR, BATTLE OF (1644), between Royal forces under Prince Rupert and forces of Parliament and Scotland under Manchester, Fairfax, and Leven; field 7 miles W. of York; decisive Parliamentary victory due to Cromwell.

MARSTON, PHILIP BOURKE (1850-87), Eng. poet; *s.* of Dr. Westland M., the dramatist; repute of his verse was largely due to compassion for his blindness.

MARSUPIALS. The members of the Mammalian sub-class Marsupialia, known also as Didelphia and Metatheria, include the curious pouched mammals of Australia and the opossums of America. Except in the case of some of the latter, they are characterized by the presence of a brood-pouch or *marsupium*, into which the delicate young are placed after a short gestation of five weeks in some kangaroos and a fortnight in the opossum, equivalent respectively to the gestation periods of the rabbit and the mouse. Within the pouch the young are fed from teats to which they are firmly attached, and as they are incapable of sucking or swallowing, the milk is forced down their throats by compression of the muscles covering the mammary gland of the mother, the pouch also serving to protect and support them.

The various animals of this section present many distinctive anatomical peculiarities, the more essentially characteristic being shown in the reproductive organs. In the female there are two uteri and two vaginæ, and the scrotum of the male is suspended in front of the penis. The brain is poorly developed and small in proportion to the size of the animals, and the succession of teeth is peculiar in that the milk dentition is represented only by a single tooth on each side of upper and lower jaws. In some no milk teeth at all have been discovered.

The habits of Marsupials present great differences, some, as the kangaroos, are entirely terrestrial, others burrow in the soil, such as the bandicoot and marsupial mole; the water-opossum is aquatic in its habits, while its closest

relatives, the opossums, are arboreal; and the flying phalangers have made an attempt to conquer the air.

While opossums are mostly carnivorous or insectivorous, except the aquatic forms which live on small fish, crustacea, and water insects, the smaller marsupials, such as the bandicoot and the wombat, live on roots and vegetable substances, the kangaroos and wallabies are altogether vegetarians, the larger subsisting on grass and herbage, the smaller species on roots.

The order Marsupialia is divided into two sub-orders, each containing two families. The sub-order Polyprotodontia includes the Didelphyidæ, a family of Amer. opossums of arboreal habit, with the exception of the aquatic yapock or water-opossum. The prehensile tail is very long, and the mother, in cases where the pouch is absent, carries the young on her back, their tails coiled round hers.

The S. American marsupial mole (*Notoryctes*) of burrowing habit is the sole representatuve of the family Notoryctidæ, which, with the civet-like dasyure and bandicoot families, are also included in this division.

The second sub-order, Diprotodontia, comprises the nocturnal vegetarian wombats (Phascolomyidæ) found in Tasmania and Australia. They are short-tailed terrestrial creatures, about the size of a badger. The nocturnal, arboreal phalangers (Phalangeridæ), popularly known as cuscuses, or Australian opossums, are represented by species varying greatly in outward characteristics, from small shrew-like creatures such as the long-snouted phalanger of W. Australia to the tailless koala or 'native bear' (*Phascolarctos cinereus*) of E. Australia, the size of a large cat. One genus, the so-called flying phalanger (*Petaurus*), is provided with a flap of skin stretching between the limbs, which enables it to leap from tree to tree.

Lastly, the family Macropodidæ includes the kangaroos, with allied forms, the wallabies, and the rat kangaroo or poteroo. The true kangaroos (*Macropus*) are confined to Australia, New Guinea, and Tasmania. The grey kangaroo or old man (*Macropus giganteus*), the largest living quadruped on the continent, has amazing powers of leaping; the hind-limbs, bearing four claws, are excessively long, and give the animal great advantage in bounding. Its long tail helps to preserve the balance of the kangaroo, which preserves an erect pose while at rest, the short forelimbs bearing five claws, which, however, possess great strength, rarely touching the ground except when the animal is feeding. The poteroo or rat kangaroo (*Hypsitrimnus*), a native of New South Wales, is a small greyish-brown creature the size of a rabbit, with long tail and long, thin snout.

The kangaroos browse on crops and herbage, and are hunted down with dogs on account of the damage they do to pastures.

MARTELLO TOWER, a rounded, solidly built piece of masonry, about 40 ft. high, originally erected for defense of coast in south of England and Ireland during Napoleonic Wars.

MARTEN. See WEASEL FAMILY.

MARTEN, HENRY (1602-80), Eng. regicide; member of Committee of Public Safety, 1642; most energetic promoter of king's death; found guilty of regicide, 1660, but suffered captivity, not death penalty.

MARTENS, FRÉDÉRIC FROMMHOLD DE (1845-1909), Russ. jurist and diplomatist; important influence on development of international law; employed in various international cases and prominent at Hague Conferences; writings of world-wide renown.

MARTHA'S VINEYARD (*c.* 41° 23′ N., 70° 38′ W.), island, off S.E. coast of Massachusetts, separated from Elizabeth Islands by Vineyard Sound; area, *c.* 100 sq. miles; discovered by Gosnold in 1602; formed part of Massachusetts, 1644-54; after which it was for several years independent; permanently annexed to Massachusetts, 1691; invaded by British, 1778, 1812; surface generally level; contains number of villages, some of which are favorite summer resorts; formerly whaling center; sheep bred; fisheries. Pop. *c.* 6000.

MARTIAL LAW, government of country or army, during suspension of ordinary codes, by military commander with absolute power. Its purpose is to facilitate execution or imprisonment of persons dangerous to existence of State; ordinary forms are observed as far as possible; act of indemnity is granted to military commander who has judged civilians, after civil code has been restored.

MARTIAL, MARCUS VALERIUS MARTIALIS (43° *c.* 104), Lat. epigrammatist; *b.* in Spain in reign of Claudius; came to Rome, 66 A.D., in Nero's reign. As panegyrist of the emperors he was rewarded lavishly, yet fulsome flattery of Domitian was turned into severest ridicule after his patron's death. Trajan, however, was proof against M.'s obsequious flattery, and the last few years of the poet's life were passed in com-

advance towards Paris, Sept. 1914; two of his divisions detailed to watch British during von Kluck's flank march; led the Beskiden corps on the Eastern front, 1915; commanded 2nd Army, 'Michael 2' in the counter-attack after Byng's tank advance, Nov. 1917; his army lay from S. of Cambrai to the Omignon stream during great Ger. offensive, March 1918; subsequently received command of the 5th Army in the Verdun sector, where he suffered badly in the attacks of the 1st Amer. and 4th Fr. Armies, Sept. 1918.

MARX, HEINRICH KARL (1818-83), Ger. Socialist; the son of a Jewish lawyer, a convert to Protestantism, was born at Trèves; took the degree of Doctor of Philosophy at Berlin, 1841; met Friedrich Engels in Paris, 1844, with whom he was associated till his death; pub. the Communist Manifesto (*Manifest der Kommunisten*), 1847, and became chief editor of the *Neue Rheinische Zeitung* at Cologne in 1848; acquitted on the charge of high treason, Marx was expelled from Prussian territory, 1849, and shortly afterwards settled in London where he remained for the rest of his life.

He was the moving spirit in the International Working Men's Association from 1864 to 1870; pub. his most important book, *Das Kapital*, 1867, which has been justly called the Bible of German Socialists. It is a scientific study of industrial conditions, and from these investigations the theory is maintained that materialist conceptions have guided the history of man. The theory of surplus value is also deduced, (*i.e.*) that the workman's wages tend to fall to the minimum of subsistence, and that all profits, rent, and interest are part of the value which the labor of the workman has produced, and are, in fact, surplus value. The theories of Marx were utilized by the Bolsheviki of Russia in their government and propaganda. See BOLSHEVISM.

MARY I. (1516-58), queen of England and Ireland; *dau.* of Henry VIII. and Catharine of Aragon; *b.* at Greenwich; after mother's divorce treated as illegitimate; forced to become lady-in-waiting to half-sister Elizabeth; succ. bro., Edward VI., 1553; crushed Wyatt's rebellion with great severity; had Lady Jane Grey executed, 1554; influenced by Gardiner; *m.* Philip II. of Spain, 1554; quelled resulting insurrection; in war with France, lost Calais. In her reign England was absolved by Cardinal Pole and reconciled to the pope; heresy laws were revived, and Protestants were persecuted, nearly 300 being burnt at the stake; hence epithet 'Bloody Mary' attached to her name.

MARY (1631-60), *dau.* of Charles I. of England; *m.* William of Orange, 1641; mother of William III.

MARY (1457-82), Duchess of Burgundy, 1477; *m.* Emperor Maximilian I.

MARY (1496-1533), queen of France; *dau.* of Henry VII. of England; *m.* Louis XII., 1514; subsequently *m.* Duke of Suffolk.

MARY II. (1662-94), queen of Eng.; *dau.* of James II. by first wife; *m.* William of Orange, 1677, with whom she became joint sovereign of United Kingdom in 1689.

MARY OF LORRAINE, MARY OF GUISE (1515-60), wife of James V. of Scotland; regent during minority of her dau., Mary, Queen of Scots, whose marriage with dauphin of France she arranged; governed during Mary's absence in France; with Fr. assistance warred against Protestants; deposed by Lords of Congregation, 1559.

MARY OF MODENA (1658-1718), second wife of James II. of England; supported Jesuits; escaped to France at Revolution, 1688.

MARY MAGDALENE, disciple of Jesus who had cast out of her 'seven devils'; first witness of His resurrection; type of repentant sinner (see also *Luke* 8^{2}, 7^{37}).

MARY, MOTHER OF JESUS, called the Virgin M., is mentioned in the accounts of the nativity in Matthew and Luke, concerning which it has been said that Matthew tells the story from the side of Joseph, Luke from that of M.; elsewhere in the Gospels she appears only a few times; in Mark only it is recorded that His mother and brethren thought Christ mad; in *John* 19^{26} her presence is mentioned at Cana, and, at the Crucifixion, her Son's entrusting her to the care of St. John. Outside the Gospels she is only mentioned in *Acts* 1^{14}. According to apocryphal writings, which give an elaborate account of her infancy, she was the child of Joachim and Anna. Many controversies have raged round the amount of reverence to be paid to her. Opposition to the place accorded her in Catholicism has been one of the features of Protestantism.

MARY, QUEEN (1867), (Victoria Mary Augusta Louise Olga Pauline Claudine Agnes), consort of George V.; married George, Duke of York, July 6, 1893. Crowned queen, June 22, 1911.

MARY, QUEEN OF SCOTS (1542-87), *dau.* of James V. and Mary of Guise; *b.* at Linlithgow Palace, Dec. 1542; succ. on her *f.*'s death few days

later. Betrothed to Francis, dauphin of France, 1548; went to France, where she remained twelve years; *m.* dauphin, 1558; after his death, 1560, returned to Scotland, 1561. Met John Knox soon after arriving; first acts conciliatory to Protestants; *m.* Henry, Lord Darnley, 1564, on which Murray and others raised forces against her, but were dispersed, 1565; Darnley's subsequent behavior alienated her affection; he opposed her policy, and further offended her by share in Rizzio's murder, although reconciliation apparently took place. Bothwell now began to influence her; he probably made arrangements for explosion of Darnley's lodging in Kirk o'Field, Edinburgh, which occurred Feb. 9, 1567; Darnley was found dead next day in adjoining garden, apparently strangled by Bothwell's fellow-conspirators while trying to escape. M.'s knowledge of, or share in, murder has long been matter of debate; Bothwell was acquitted through lack of witnesses; three months later M. *m.* Bothwell. Prot. leaders took up arms with purpose of freeing her from him. At Carberry Hill M. surrendered, and Bothwell was allowed to withdraw in safety; M. was taken to Holyrood, subsequently to Lochleven, where she abdicated, June 24, 1567. Escaping from Lochleven, May 1568, by aid of George and Willie Douglas, M. revoked abdication; her followers assembled an army, which was utterly defeated at Langside. M., fleeing to England, lived some time in Bolton Castle, Yorkshire; removed to Tutbury, 1569; subsequently taken to Sheffield Castle; concerned in plot for Span. invasion of England; Norfolk executed for implication in conspiracy; M. more strictly confined, 1572; removed to Wingfield Manor, 1584; to Tutbury, 1585; subsequently to Chartley Castle and Texall. Almost certainly concerned in Babington's conspiracy against Elizabeth's life and crown; removed to Fotheringay Castle, Sept.; tried, Oct. 1586, first at Fotheringay Castle, subsequently in Star Chamber; found guilty of plotting against Elizabeth's life and sentenced to death; executed after some delay, due to Elizabeth's reluctance to sign warrant; met death with same courage by which whole life was marked.

MARYBOROUGH.—(1) (25° 35′ S., 152° 43′ E.), seaport, Queensland, Australia, on Mary River; foundries, flour-mills, sugar-mills. Pop. 12,000.

MARYLAND, state near center of E. coast of U.S. (38° 30′ N., 77° 20′ W.); bounded N. by Pennsylvania, E. by Delaware, Atlantic, S. and S.W. by Virginia and W. Virginia, W. by W. Virginia; has only about 35 m. of coast on Atlantic, but Chesapeake Bay, the Susquehanna, Patapsco, and Potomac rivers provide harbors; surface rises to Blue Ridge dist. of Appalachians, eastern half of state being and the western mountains reaching height of 3,500 ft. Cap. Annapolis; largest towns are Baltimore, Cumberland, Hagerstown, Frederick. See MAP U. S.

Maryland played an important part in War of Amer. Independence, at close of which it became one of original thirteen states of Union; had share in war of 1812-15 against Britain, and in Civil War remained loyal to Union, the battle of Antietam taking place within its bounds. Recent history is uneventful.

Executive power is held by governor, who remains in office four years; legislative authority vested in general assembly, consisting of senate of 27 members and house of delegates of 102 members, elected by popular vote for four and two years respectively; sends two senators and six representatives to Congress. Education is free and obligatory; most important univ. is the Johns Hopkins in Baltimore, which is also seat of Maryland Univ. and several colleges. Annapolis, Ellicot City, Chestertown, Emmittsburg, New Windsor, and Westminster are also seats of important colleges. Inhabitants are whites (many of foreign birth), negroes, and Asiatics.

Excellent coal is mined in extreme W.; iron, chrome, copper, brick-clay, marble, soap-stone also worked; there are pine, chestnut, oak, hickory, and walnut trees, and lumbering is important industry. Maryland produces tobacco, fruits, vegetables, cereals; large trade in tinned fruit and vegetables. Live-stock raised, dairy-farming carried on. Valuable fisheries, especially oysters. Manufactures cottons, woolens, iron and steel, tin wares, flour, artificial manures. Railway mileage, *c.* 2,000 m. Area, 12,327 sq. m., of which 2,386 sq. m. are water; pop. 1920, 1,449,661.

MARYLAND AGRICULTURAL COLLEGE, a state institution, founded in 1856, at College Park. Besides its regular agricultural courses it has departments of biology, chemistry, mechanical, electrical and civil engineering. In 1912 the buildings were nearly destroyed by fire, but at the present time it has a plant valued at $525,000. Its annual income is about $170,000. The library contains 10,000 volumes. Its staff of professors and instructors numbers 40 and its student body averages 500.

MARYLAND, UNIVERSITY OF, an

institution of higher learning, founded in College Park, in 1807. Its departments include those of the liberal arts and sciences, etc. In the fall of 1921 it had a student body of 2,200 while the faculty numbered 185. The president was A. F. Wood.

MARYPORT (54° 38′ N., 3° 29′ W.), seaport, Cumberland, England, on Irish Sea; shipyards; iron foundries; in vicinity are collieries. Pop. 12,000.

MARYSVILLE, a city of California, in Yuba co. It is on the Southern Pacific Railroad and on the Yuba and Feather rivers. It has an important trade by river and its industries include iron foundries, fruit canneries and woolen mills. It is the seat of Notre Dame College. Pop. 1920, 5,461.

MARYVILLE COLLEGE, a co-educational institution, founded in 1890 under the auspices of the Presbyterian Church, at Maryville, Tenn. It has property and an endowment of about $900,000 and a library of 15,000 volumes. During the term of 1921-22 it had an enrollment of 815 students and a faculty of 62. The president then was S. T. Wilson.

MASAI, African people; originally inhabited the country between the Nile and the Karamojo; now consist of two tribes mostly residing in the Brit. East Africa Protectorate. Of fine physique, slender and tall.

MASANIELLO, TOMMASO ANIELLO (1622-47), Neapolitan fisherman who headed insurrection of Naples against the Spanish in 1647; assassinated.

MASARYK, THOMAS GARRIGUE (1850), first president of the Czecho-Slovak Republic, since 1919; studied at Lat. school and universities of Vienna and Leipzig; prof. at new Bohemian univ. of Prague, 1882; head of the Czecho-Slovak realistic movement in philosophy, literature, and politics; proved certain MSS. of Koeniginhof and Gruenberg to be forgeries; founder of several reviews; entered Parliament of Vienna, 1891; resigned, 1893; elected a deputy, 1907; resisted alike encroachments of Germany on Austria and aggressive policy of Austria in Balkans; at outbreak of war fled to Italy and Switzerland; became lecturer in King's Coll., London; organized the Slovak movement for independence; has written many works, including *The Problems of Small Nations in the European Crisis*, 1915. By the provision of the Constitution he is qualified to hold the office of president during his entire life.

MASAYA (12° 2′ N., 86° W.), town, Nicaragua, at foot of volcano M.; tobacco. Pop. 15,000.

MASCAGNI, PIETRO (1863), Ital. operatic composer; director of Rossini conservatory at Pesaro, 1895-1903; best-known work, *Cavalleria Rusticana*, 1890; has also written *L'Amico Fritz*, 1891; *Les Rantzau*, 1893; *Ratcliff*, 1895; *Iris*, 1898; *Isabeau*, 1911; *Parisina*, 1913.

MASCARA (35° 22′ N., 0° 7′ E.), fortified town, Algeria; burned by the French in 1835; occupied by them in 1841; wine. Pop. 25,000.

MASCARENE ISLANDS (20° S., 57° E.), group, Indian Ocean, *viz.* Mauritius, Réunion, and Rodriguez collectively.

MASEFIELD, JOHN, Eng. dramatist, novelist, and poet; has pub. many works, including *The Everlasting Mercy*, *The Street of To-day*, *Dauber*, 1913; *The Faithful*, 1915; *Gallipoli*, 1916; *The Old Front Line*, 1918; *Enslaved*, and *Other Poems*, 1920.

MASINISSA (*c.* 238-149 B.C.), king of E. Numidians; introduced civilization into Numidia; deserted Carthaginian for Rom. alliance; commanded for Rome at battle of Zama, 202, and received western Numidia as reward; strove to annex Carthage, and stirred up third Punic War.

MASK, IRON. See IRON MASK.

MASKELYNE, NEVIL (1732-1811), Eng. astronomer-royal; commenced publication of *Nautical Almanac*, 1767; determined gravitational attraction of mountain Schiehallion, 1774.

MASON, ALFRED EDWARD WOODLEY (1865), Eng. dramatic author and novelist; Liberal M.P. for Coventry, 1906-10. Among his numerous works are *The Courtship of Morrice Buckler*, 1896; dramatized 1897; *Parson Kelly*, with Andrew Lang, 1899, *Miranda of the Balcony*, 1899; dramatized New York, 1901, *Clementina*, 1901; dramatized 1910; *The Four Feathers*, 1902; *The Broken Road*, 1907; *Open Windows*, 1913; *The Four Corners of the World*, 1917; *At the Villa Rose*, 1910; *The Summons*, 1920.

MASON CITY, a city of Iowa, in Cerro Gordo co., of which it is the county seat. It is on the Chicago, Great Western and other railroads. It is the trade center of an extensive agricultural and fruit growing district. It is the seat of the National Memorial University and an Odd Fellows' Home. Pop. 1920, 20,065.

MASON, DANIEL GREGORY (1873), musician. *b.* in Massachusetts. Graduated in 1895 from Harvard.

Studied music in Paris, New York and Boston. Associate professor of music Columbia University; Composer, *Elegy* (for the piano) 1901; *Sonata for Violin and Piano*, 1912; *Pastorale for Violin, Clarinet and Piano*, 1913; *Country Pictures* (piano) 1913; *Quartet for Piano and Strings*, 1914; *Symphony*, 1917; *String Quartet*, 1918; *Prelude and Fugue* (for piano and orchestra), 1919. Author: *From Grieg to Brahms*, 1902; *Beethoven and His Forerunners*, 1904; *The Romantic Composers*, 1906; *Contemporary Composers*, 1919.

MASON, GEORGE (1725-92), an American statesman, *b.* in Fairfax County, Va. He belonged to an aristocratic family of planters, neighbors of Washington, and with Washington was a member of the Virginia Assembly. It was he who drafted the non-importation resolutions which Washington presented to the Assembly and which were unanimously passed. He was a member of the Virginia Committee of Safety, in 1775; he drafted the Declaration of Rights and the State Constitution, in 1776; he was elected to the Continental Congress, in 1777, and in 1787 he was a prominent member of the Convention which framed the Federal Constitution. He stands forth prominently as the leading opponent of the institution of slavery at that time, and when his clause providing for the control of the slave traffic by Congress was eliminated from the draft, he refused to sign it. He and Patrick Henry were the two leading opponents of slavery in the Virginia convention. When elected to the U.S. Senate, some years before his death, he declined.

MASON, JAMES MURRAY (1798-1871), Amer. politician; Confederate Commissioner to Britain, 1861; taken on steamer *Trent*; imprisoned till 1862.

MASON, JOHN YOUNG (1799-1859), Amer. diplomatist; sec. of navy, 1844-45 and 1846-49; attorney-general 1845-46; U.S. minister to France, 1853-59; assisted in composing Ostend Manifesto.

MASON, WILLIAM (1725-97), Eng. minor poet; wrote tragedies and miscellaneous verse, but is remembered as the literary executor of Gray, whose *Memoirs* he pub. in 1775.

MASON AND DIXON'S LINE, the boundary between Pennsylvania and Maryland, running on the parallel of 39° 43′ 26″. Because of a dispute over the boundary between the possession of the Penn family and those of the Lords Baltimore the proprietors agreed on a survey, which was made in 1767 by two English surveyors, Charles Mason and Jeremiah Dixon, the line as they marked it being about 250 miles in length and running through dense, difficult forests. As this line divided the southernmost free state, Pennsylvania, from Maryland, the northernmost slave state, it has been commonly referred to as the dividing line between slavery and freedom, but the celebrated compromise line, agreed to by Congress in 1820 as the northernmost boundary of slave territory, a preliminary condition of the admission of Missouri as a slave state, runs along the parallel of latitude 36° 30′.

MASONRY, the earliest remaining examples of m. are found in ruins of ancient Egyptian and Ind. temples. The most striking feature about these buildings is the great size of the stones, and it is difficult to understand how the ancients quarried and manipulated them with the machinery at their disposal. In structures such as the Egyptian Pyramids no mortar was used, and the joints were polished and fitted with minute accuracy. In some of the oldest remains in Greece and Italy irregular blocks of great size were used, the intervening spaces being filled up with small stones. Gk. and Rom. m. bears considerable resemblance to that of today. Buildings of the early Middle Ages consisted of rough rubble work, and though the Normans made considerable improvements their workmanship was generally poor. During the development of Gothic arch. m. advanced steadily, and ashlar walling, consisting of carefully dressed blocks of from 12 to 18 in. deep, with mortar joints up to ⅛ in. thick, took the place of rubble. Ashlar work was used by the Renaissance masons, and a later development is the employment of hammer-dressed m. The tools used consist of different kinds of hammers, mallets, saws, and chisels; rules, set-squares, spirit-levels, plumb-lines, mortar trowels, etc. Hoisting apparatus and scaffolding are also required.

MASONRY, FREE. See FREE MASONRY.

MASPERO, GASTON CAMILLE CHARLES (1846-1916), Fr. Egyptologist; prof. of Egyptology at Collège de France, 1873-81; director of explorations in Egypt, and keeper of the Bulak Museum, 1881-1914. His works include *Manual of Egyptian Archaeology* (Eng. trans. 5th ed. 1902), *Histoire Ancienne des Peuples de l'Orient* (6th ed. 1904; Eng. trans. *Dawn of Civilization*, 4th ed. 1901), *Histoire Ancienne des Peuples de l'Orient Classique*, 1895-9; 6th ed. 1904), and *Art in Egypt*, 1912.

MASQUE, MASK, drama in which spectacular effect, music, dancing, etc., are prominent and characterization and plot subsidiary; originally a performance of 'masked' revelers. The m. flourished in England during early XVII. cent.; Ben Jonson wrote nearly 40; Inigo Jones as decorator and Henry Lawes as musician were usually employed. Milton's *Comus* is a typical m.; its subject is pastoral and allegorical. Other m. writers were Campion, Daniel, Carew, Browne, Shirley, Davenant.

MASS (Fr. and Ger. *messe*, Ital. *messa*, from Lat. *missa*), first clear use of word for service of Eucharist by St. Ambrose, and it came to denote the service from the formal dismissal (*missa*) of the congregation at the end *ite missa est*; language at first Gk. had become by V. cent. Lat.; present Rom. m., a service of gradual growth, has following order: preparatory prayers (foot of altar), introit, *Kyrie Eleison* (Lord have mercy upon us), *Gloria in excelsis* (Glory be to God on high), collects, epistle, gospel, offertory and *Lavabo*, preface, Canon (centering in the consecration and ending with *Amen* before saying the *Our Father*), Communion, prayers after Communion, dismissal (*ite missa est*), blessing of the congregation, Gospel of St. John.

MASS See MATTER; PHYSICS.

MASSA (45° 1′ N., 11° 18′ E.), town, capital of Massa-e-Carrara, Tuscany, Italy; marble quarries. Pop. 35,000. The province of Massa-e-Carrara has area of 687 sq. miles. Pop. 1911, 215,000.

MASSA MARITTIMA (43° 5′ N., 10° 55′ E.), town, Grosseto, Tuscany; bp.'s see; iron mines, mineral springs. Pop. 10,000.

MASSACHUSETTS, one of New England states of U.S. (42° 3′ N., 71° 43′ W.), bounded N. by Vermont and New Hampshire, E. by Atlantic, S. by Atlantic, Rhode Island, Connecticut, W. by New York State; off coast are Martha's Vineyard and Nantucket Islands; surface flat along coast, elsewhere undulating, reaching height of over 3,500 ft. in W., which is occupied by Berkshire Hills, part of Appalachians; highest peak, Mt. Greylock, 3,530 ft. Drained by Housatonic, Connecticut, Millers, Merrimac, and Chicopee. Cap. Boston; other large towns are Worcester, Fall River, Lowell, Cambridge. Massachusetts is preeminently a manufacturing state at present time, although until middle of last century it was almost entirely agricultural. A considerable area is wooded, and the valleys are fertile, corn, potatoes, and tobacco being grown; it is center of U.S. whale, deep-sea, and coast fishing; important center also of commerce and export. Manufactures boots and shoes, cotton, woolens, iron and steel goods, machinery, leather, paper, rubber goods; shipbuilding, meat-packing; ice trade also carried on. Coal and iron pyrites occur, but mining is unimportant. Railway mileage, 2,133. See MAP U. S.

The first permanent settlement was made by the Pilgrim Fathers. Another Puritan colony settled at Salem in 1628, and became the Massachusetts Bay colony. In 1629 the prov. of New England was created, and the government was divided between these two colonies, which united in 1692.

Early history is marked by struggles with Indians; by rigorous enforcement of Puritan religion, nonconformity to which was punishable by death; and by continuous struggle against the mother country. Massachusetts took leading part in War of Amer. Independence; battles of Lexington and Bunker's Hill were fought in the state, which became one of the original thirteen states of the Union, and as such took part in war of 1812-15 against Britain.

Executive power is held by governor, assisted by lieut.-gov. and by an executive council of 8 members; the governor and council may apply to the supreme court for advice on legal matters; legislature is called the General Court of Massachusetts, and consists of senate of 40 members and house of representatives of 240 members; represented at Washington by 2 senators and 16 representatives. The state is divided for purposes of local administration into 14 counties.

Education is free and obligatory; the state has seventeen universities and colleges, of which most celebrated is Harvard Univ., Cambridge, founded in 1636; other towns containing colleges are Amherst, Boston, Medford, Northampton, South Hadley, Wellesley, Williamstown, Worcester. Boston has long been famed as center of Amer. culture.

Massachusetts is densely populated. Area, 8,266 sq. m., of which 227 sq. m. are water. Pop. 1920, 3,852,356.

MASSACHUSETTS AGRICULTURAL COLLEGE, a co-educational institution founded by the State at Amherst, Mass., chartered in 1863 and opened in 1867. It has over 700 acres of land, 250 of which are devoted to general farming, 100 to horticulture, and 175 to a campus. The regular course is four years, but special short courses are open to women in dairying, market gardening, etc. and during the winter short courses are

offered to those who have not the time to study extensively. The faculty numbers about 60 and the student body averages 570.

MASSACHUSETTS BAY, a wide, triangular indentation of the east coast of Massachusetts, reaching from Cape Ann to Plymouth Harbor, a distance of 42 miles and 22 miles in depth. The north shore of the bay is rocky and in places high, while the south shore, in the direction of Cape Cod, is low and sandy or swampy. The stretch within the bay includes the harbors of Gloucester, Salem, Marblehead, Lynn and Boston. Cape Cod Bay, to the south, is sometimes included as part of Massachusetts Bay.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, the leading institution of its class in the United States, is a non-sectarian stitute of the applied sciences, founded in 1861, at Cambridge. Mass. During the term of 1921-22 there was an enrollment of 3,505 students, who were divided as follows; about 500 each in mechanical, electrical and engineering administration; 400 in chemical engineering; 300 in civil engineering; 100 in mining, architecture and naval architecture, the rest being distributed among the following departments; chemistry, biology, physics, general sciences and engineering, sanitary engineering and geology. The full teaching staff numbered over 500. The yearly income is over $2,000,000 the productive funds being about $15,000,000.

MASSACRE OF ST. BARTHOLOMEW. See BARTHOLOMEW, MASSACRE OF, ST.

MASSACRES, ARMENIAN. See ARMENIAN MASSACRES.

MASSAGE, term applied to a method of treatment of disease, consisting of the manipulation and movement of the patient's muscles and joints by the hands of the operator or masseur. It includes stroking, kneading, rubbing, and tapping the skin and deeper tissues; in the more advanced stages, moving and bending the limbs by the masseur while the patient remains passive; and, still more advanced, the patient offering resistance to the movement of his limbs by the masseur, thus leading up to ordinary exercise of the body. The effect of m. is to improve nutrition and to aid the elimination of waste products in the tissues, by hastening tissue metabolism and facilitating and increasing the flow of blood and lymph.

MASSASOIT (1580-1661), an Amer. Indian chieftain, sachem of the Wampanoags, whose territory covered southern Massachusetts, from Cape Cod to Narragansett Bay, said to have numbered 30,000, but who were reduced to about 3,000 by an epidemic shortly before the settlement of the Pilgrims at Plymouth. On March 22, 1621, when the settlement had been established only a few months, Massasoit appeared in full regalia, accompanied by sixty warriors, and welcomed the Englishmen heartily. On that occasion a treaty of peace and mutual good-will was signed and for fifty years faithfully observed by both sides. Massasoit is described as a large, portly, dignified and good-natured personality, of a peaceful disposition. He lived at a place which is now the site of Warren, R.I.

MASSENA, a city of New York. Pop. 1920, 5,993.

MASSÉNA, ANDRE (1758-1817), duke of Rivoli, marshal of France; won battle of Saorgio, 1795; commanded army in Switzerland, 1799; victorious at Zürich; defended Genoa, 1800; became marshal, 1804; defeated Archduke Charles at Caldiero, 1805; served against Austria, 1809; won victory at Aspern-Essling; commanded in Spain, 1809-12; defeated by British; subsequently commanded at Marseilles.

MASSENET, JULÉS EMILE FRÉDÉRIC (1842-1912), Fr. composer; best-known opera, *Manon*, 1884; others, *Roi de Lahore*, 1877; *Cid*, 1885; *Werther*, 1892; *Thaïs*, 1894; *Sapho*, 1897; *Griselidis*, 1901; *Le Jongleur de Notre Dame*, 1902; *Don Quichotte*, 1910; also orchestral works.

MASSEY, GERALD (1828-1907), a poet, *b.* near Tring, Herts. As a boy he worked in a silk factory, but in 1843 he came to London, where he was taken up by Maurice and Kingsley. His first book was published in 1851, and this was followed by four others: a selection from these was published in 1889, entitled *My Lyrical Life*. Later he wrote and lectured on spiritualism, and produced prose works on the origin of myths and mysteries in *The Book of Beginnings*, 1881; *The Natural Genesis*, 1883; and *Ancient Egypt: the Light of the World*, 1907. He also wrote a book on the sonnets of Shakespeare.

MASSICUS MONS, modern **MONTE MASSICO** (41° 12′ N., 13° 54′ E.), mountain, on border of Campania and Latium, Italy; wines.

MASSILLON, a city of Ohio in Stark co. It is on the Wheeling and Lake Erie, the Pennsylvania and Northern Ohio Traction and Light Company railroads, and on the Tuscarawas river

and the Ohio canal. It is in the famous Tuscarawas valley coal fields and its industries are connected chiefly with coal mining. They include also machine shops, rolling mills, agricultural implement works, bridge works, pottery works, etc. It is the seat of the State Hospital, an asylum for the insane. Pop. 1920, 17,428.

MASSILLON, JEAN BAPTISTE (1663-1742), Fr. ecclesiastic; famous preacher in Paris; bp. of Clermont, 1817; a tolerant and intellectual man, laying stress on morals rather than dogma.

MASSINGER, PHILIP (1583-1640) Eng. dramatist; *s.* of a retainer in Pembroke family; ed. Oxford; collaborated with Fletcher, Dekker, and Tourneur in playwriting. Chief plays, *The Virgin Martyr*, 1622, with Dekker, *The Duke of Milan*, 1623, *The Great Duke of Florence*, 1627, *The City Madam*, 1632, *A New Way to Pay Old Debts*, 1633. Coming at end of great Elizabethan dramatic period he shows decadence, but he never descends to 'blood and thunder' as Ford does.

MASSINISSA (238?-*c.* 149 B.C.), king of Numidia, fought for Carthage against Rome till latter's victory in 206; then ally of Rome, from whom he received increased territory; disciplined army and civilized his kingdom.

MASSON, DAVID (1822-1907), Scot. man of letters; *b.* Aberdeen; prof. of Eng. Lit. at Univ. Coll., London, 1852, Edinburgh Univ., 1865-95; chief work, *Life of Milton*; wrote *De Quincey* (E.M. L.); edit. *Macmillan's Magazine*, 1858-65.

MASSON, FRÉDÉRIC (1847), Fr. historian, formerly librarian at the Fr. Foreign Office; academician and life secretary of the Academy. His works include *Napoleon et les Femmes*, 1893; *Napoleon et sa Famille*, 9 vols., *Napoleon chez lui*, 1894; *Josephine Imperatrice*, 1898; *Napoleon et son Fils*, 1908.

MASSOWAH, MASSAWA (15° 40′ N., 39° 30′ E.), fortified seaport, W. coast, Red Sea, Eritrea, on a small coral island; chief port for Abyssinia and Egyptian Sudan; exports hides, coffee, gold, ivory; hot and unhealthy; became an Italian possession in 1885. Pop. 7800.

MAST, upright pole composed of single tree or number of planks upon which spars and sails are hung; ordinary ships have three—fore, main, and mizzen—generally divided into main, top, and top-gallant m's; nowadays frequently metal cylinders.

MASTER, a person qualified to be in authority.

MASTER-SINGER. See MINNESINGERS.

MASTERS, EDGAR LEE (1869), an American author, *b.* in Garnett, Kans. After graduating from Knox College, in Illinois, he studied law in his father's office and was admitted to the bar, in 1891, continuing to practice. Among his books are *Maximilian* (a drama in blank verse, 1902); *The New Star Chamber and Other Essays*, 1904; *The Blood of the Prophets*, 1905; *The Great Valley*, 1916; *Mitch Miller*, 1920, and *The Open Sea*, 1921.

MASTIC, MASTICH, resin exuded from *Pistacia lentiscus*, an evergreen shrub growing on Mediterranean shores; found as yellow 'tears'; M.P. *c.* 108° C. Alcohol separates two resins

MASTICATION. See DIGESTION.

MASTIFF. See DOG FAMILY.

MASTODON, see under ELEPHANT.

MASULIPATAM (16° 9′ N., 81° 11′ E.), seaport, capital of Kistna, Madras, India, on Coromandel coast; cotton manufactures. Pop. 40,000.

MASURIAN LAKES, BATTLE OF, name given by the Germans to the 'second Tannenberg,' in which the Russians were heavily defeated in their second invasion of E. Prussia (Feb. 1915). It resulted in the expulsion of the Russians from Ger. territory.

MATABEI, IWASA (1578-1650), Jap. artist; founder of the Ukioyé school, the members of which commonly used subjects drawn from the daily life of the people, and only occasionally birds, flowers, and landscapes.

MATABELE, Zulu race in Rhodesia.

MATABELELAND. See RHODESIA.

MATAMOROS (18° 23′ N., 98° 40′ W.), city, port on Rio Grande, Tamaulipas, Mexico; exports hides, wool; taken by Americans, 1846. Pop. 9000.

MATANUSKA RIVER, a stream emptying into Kink Arm, Cook Inlet, Alaska, insignificant in itself, but noted on account of the rich coal deposits along its banks, known as the Manuska coal fields, recently the object of Federal legislation and discussion of conservation as a national policy.

MATANZAS (23° 3′ N., 81° 37′ W.) city, capital of Matanzas, Cuba, on N. coast; exports sugar, molasses; after Havana, chief commercial port of the island. Pop. 36,000. Matanzas province

has area of 3700 sq. miles. Pop. 260,000.

MATAPAN, CAPE, in Greece, is the southernmost point of Morea, 36° 22′ N. lat.

MATARÓ (41° 33′ N., 2° 24′ E.), seaport, Barcelona, Spain, on Mediterranean; textiles. Pop. 20,000.

MATCH replaced tinder-box, *c.* 1820; at first mixture of potassium chlorate and sugar fired by sulphuric acid; friction-matches used *c.* 1835; now made of potassium chlorate and phosphorous on pine chip, which react on friction; in safety matches red phosphorus is placed on striking surface, match consisting of antimony sulphide and potassium chlorate; chiefly made in United States, Sweden and Belgium; government monopoly in France.

MATE.—(1) nautical term; officers of merchant vessels next in rank to captain; (2) naval; m. signifies subordinate to warrant officer, (*e.g.*) boatswain's mate.

MATÉ, PARAGUAY TEA, is the product of *Ilex paraguayensis*, a S. Amer. tree, allied to the holly, *Ilex aquifolium* (*Aquifoliaceae*). The leaves contain caffeine, an alkaloid also contained in the berries of the coffee plant. They are carefully prepared, and are broken up and used like tea. The flowers are unisexual.

MATERA (40° 40′ N., 16° 36′ E.), town, Potenza, Italy; seat of abp. Pop. 17,000.

MATERIA, MEDICA. See PHARMACY.

MATERIALISM, explains universe on assumption of matter, extended, eternal, impenetrable, capable of movement; mind explained as dependent on matter.

MATHEMATICAL TABLES, a time- and labor-saving device by which calculations are expedited and results obtained with a definite accuracy. They range from simple factor tables to tables of all the functions met with in higher math's. *Factor tables* give usually the least factor of numbers which are not divisible by 2, 3, or 5. Chernac's *Cribrum Arithmaticum* (1811) gives all the prime divisors of such numbers up to 1,020,000. Lehmer's *Facto Table*, 1909, gives the least factor of all numbers not divisible by 2, 3, 5, or 7 up to 10 millions. The best *multiplication table* is Crelle's *Rechentafeln*, 1857, giving all products up to 1000 × 1000. It is arranged to give all the multiples of any one number on a single page.

For *Powers and Roots* of numbers Barlow's *Tables*, 1840, giving cubes, squares, square and cube roots, and reciprocals of numbers up to 10,000.

Trigonometrical tables and *tables of logarithms* are usually published together, and since the invention of logarithms the logarithms of the various trigonometrical functions have been given in preference to the natural functions. Ten-figure logarithms of numbers to 100,009 are given by U.S. Coast and Geodetic Survey. Babbage's seven-figure logarithm tables extend to 108,000; Sang's tables are from 20,000 to 200,000.

MATHEMATICS is the science which deals with the laws and properties of plane and solid figures, numbers, and quantities. Pure Mathematics includes the following branches:—

Arithmetic, which deals with numbers only; *Algebra*, wherein arithmetical laws are developed and extended to general quantities which are expressed by symbols (usually letters of the alphabet); *Geometry*, dealing with the properties of plane and solid figures, was developed to a high stage by the Greeks over 2200 years ago, and greatly advanced in the XVII. cent. by Descartes, who introduced a general method —now called *Analytical Geometry*—of attacking geometrical problems; *Trigonometry*, which deals chiefly with angles and lengths of sides of triangles, and is essential to land-surveying; the *Differential Calculus*, invented independently by both Newton and Leibnitz, treats of the rates of increase of functions by infinitely small steps (as a simple example, if $y=3x$, y is said to be a function of x; now, if x is increased by an amount, however small, y will evidently also be increased by three times that amount, and the rate of increase of y with respect to x will be 3); the *Integral Calculus*, in which the Differential Calculus is utilized in summing up infinitely small quantities.

Some subjects which specially require mathematical treatment, such as Astronomy, Optics, Statics, Dynamics, Hydrostatics, etc., come under the heading of Applied Mathematics. There is no branch of natural philosophy which can be satisfactorily developed without an application of mathematics.

MATHER, COTTON (1663-1728), Amer. Congregationalist divine; ed. at Harvard; pastor at Boston, 1681; prominent in prosecution for witchcraft, in which he firmly believed; helped to found University of Yale, 1718; intensely disliking the liberal tendencies of Harvard; aroused great opposition by favoring vaccination; a learned and able, if narrow, man; wrote several works.—Samuel Mather (1706-85), his *s.* minister at Boston.

MATHER, INCREASE (1639-1723), Amer. divine; ed. at Harvard and Trinity Coll., Dublin; went to Boston, 1661; became a religious leader in New England; continued preaching in Boston while pres. of Harvard Univ. M. was an orthodox Congregationalist.

MATHER, RICHARD (1596-1669), Eng. Congregational divine; refused to conform to ritual law of Anglican Church and went to America, 1635.

MATHERAN (18° 59′ N., 73° 18′ E.), hill sanatorium, on W. Ghats, Kolaba district, Bombay, India.

MATHEW, THEOBALD (1790-1856), Irish apostle of temperance, known as 'Father Mathew'; established a total abstinence association in Cork, 1838, whence it spread all over Ireland, and to England and Scotland; claimed to have administered the pledge to five million of Irish people.

MATHEWS, CHARLES (1776-1835), Eng. actor; *b.* London; played at the Haymarket, Drury Lane, Covent Garden, and the Lyceum.

MATINS, in Catholic Church, first of the seven canonical hours.

MATSUKATA, MARQUIS (1835), Jap. statesman; became Minister of Finance, 1881; reformed currency, established Bank of Japan; regulated taxation, introducing European methods Prime Minister, 1891-92, 1896-98; Minister of Finance, 1898-1900.

MATSUMOTO (36° 15′ N., 137° 58′ E.), town, Hondo, Japan; baskets, silk, preserved fruit. Pop. 35,000.

MATSUSHIMA, or **SHIOGAMO-NO - MATSUSHIMO,** a pine - clad archipelago in Sendai Bay, E. coast of Shikoku, Japan, famous for its beauty. One of the 'San-Kei' of Japan.

MATSUYAMA, a tn. of Shikoku, Japan, 155 m. S.W. of Kobe. Its port, Mitsu, 4 m. distant, is on the Inland Sea. Pop. 44,000.

MATSUYE (35° 33′ N., 133° 3′ E.), town, Hondo, Japan; paper. Pop. *c.* 36,000.

MATSYS, QUENTIN, MASSYS (1466-1530), Flemish artist; studied at Antwerp; best known by his religious pictures, but he also ranks high for his genre pieces and portraits.

MATTEAWAN, a vil. of Dutchess co., New York, U.S.A., 1 m. E. of the Hudson R.; contains state hospital for criminal insane.

MATTER is most frequently defined as 'that which occupies space' and is classified into three groups—solid, liquid and gaseous. The definition immediately suggests the possession of *mass.* Other general properties of m. are *attraction, inertia, elasticity, indestructibility.*

MATTER, CONSTITUTION OF. See CHEMISTRY.

MATTERHORN, MONT CERVIN (45° 58′ N., 7° 40′ E.), peak of the Alps on border between Valais, Switzerland, and Piedmont, Italy, height, 14,780 ft.; first ascended, 1865, by Whymper.

MATTHEW, CANTACUZENUS (1353-57), Byzantine emperor; *s.* of John VI., whom he assisted against Thracians; warred against Serbians; forced to abdicate.

MATTHEW, GOSPEL OF ST., first in our canon, but later than *Mark* and probably than *Luke*; written perhaps *c.* 100 A.D., possibly twenty or thirty years earlier; based largely on St. Mark; also (with *Luke*) on another lost document or documents, for discourses, etc., and with some peculiar matter, (*e.g.*, story of the Nativity; distinctly Jewish in coloring, it contains some very early elements (specially, teaching of Jesus) and some late ones (*e.g.*) sayings reflecting existence of Church organization); the editor has somewhat modified and rearranged his materials in incorporating them; traditionally work of Apostle St. Matthew, who was more probably author of *Logia* (sayings)—one of sources.

MATTHEW OF PARIS, monastic writer of Eng. birth; monk of St. Albans; 1217; wrote *Chronica Majora,* continuing chronicle of Roger of Wendover from 1235-59, and also *Historia Anglorum.* M. is one of chief authorities for reign of Henry III.

MATTHEW, ST., one of twelve apostles, and traditionally author of Gospel of M., and identical with Levi the toll gatherer, *s.* of Alphæus (*Matthew* 9^9; *Mark* 2^{14}).

MATTHEW, TOBIAS (1546-1628), abp. of York (1606); wrote against Campion and sought to stamp out Rom. Catholicism in north; his *s.,* Sir Tobias (1577-1655), was exiled as R.C.

MATTHEWS, (JAMES) BRANDER (1852), an American literary critic and writer; *b.* in New Orleans, La. He graduated from Columbia University in 1871, studied law and was admitted to the bar, in 1873, but soon after devoted himself to literature. From 1892 to 1900 he was professor of literature at Columbia University, being

professor of dramatic literature since then. In his particular field he stands among the foremost, with an international reputation. Among his works are *A Secret of the Sea, and Other Stories*; *A Tale of Twenty-five Hours*; *Bookbindings, Old and New*; *The Historical Novel*; *Parts of Speech*; *A Study of the Drama*, 1910; *Shakespeare as a Playwrigh*, 1913; *A Book about the Theater*, 1916; *These Many Years*, 1917; *The Principles of Play-making*, 1919, and *Essays on English*, 1921.

MATTHEWS, STANLEY (1824-89), Amer. lawyer and Republican politician.

MATTHIAS (1557-1619), Holy Rom. emperor; superseded his *bro.*, Emperor Rudolph II., as king of Hungary, Austria, and Moravia, 1608; wrested Bohemia from Rudolph, 1611; emperor, 1612; tried policy of religious toleration but was opposed by his *bro.*, Maximilian, and Ferdinand, Archduke of Styria, ardent Catholics; lost all influence over empire.

MATTHIAS (*Acts* 1), new apostle chosen in place of Judas Iscariot.

MATTHIAS I., HUNYADI, CORVINUS (1440-90), king of Hungary; *b.* Kolozsvar; became king by election, 1458; defeated Emperor Frederick, his rival for Hungarian crown, 1462; defeated Turks; invaded Bosnia; captured Jajce, 1463; crushed revolt in Hungary, 1471; defeated Poles, 1474; claimed Bohemian crown, and after war with Bohemia acquired Silesia, Moravia, and Lausitz 1479; defeated Turks at Szászváros 1479; recaptured Jajce; expelled Turks from Servia. Again warred against emperor, 1481; took Vienna, 1485.

MATTO GROSSO (12° 30′ S., 55° W.), a western state of Brazil, bordering Bolivia; forms part of the Brazilian plateau; traversed by several low mountain chains; much of it occupied by dense forests; rich in minerals; chief industry, cattle-raising; capital, Cuyaba. Area, 532,680 sq. miles. Pop. 142,000.

MATTOON, a city of Illinois, in Coles co. It is on the Illinois Central and the Cleveland, Cincinnati, Chicago and St. Louis railroads. Its industries include broom factories, grist mills, and grain elevators. Here are the machine shops of the Cleveland, Cincinnati, Chicago and St. Louis railroads. Pop. 1920, 13,562.

MAUBEUGE (50° 17′ N., 4° 1′ E.), town, Nord, France; metal goods; machine tools. Pop. 21,500.

MAUCH CHUNK, a town of Pennsylvania, in Carbon co., of which it is the county seat. It is on the Central of New Jersey, and the Lehigh Valley railroads, and on the Lehigh Coal and Navigation Company's canal, and the Lehigh River. It is a famous summer resort and also marks the extreme limit of the anthracite coal region of Pennsylvania. Its industries include foundries shoe factories, car shops, etc. There is a county building, a Y.M.C.A. building, and a library. Pop. 1920, 5,000.

MAUDE, CYRIL (1862), Eng. actor and manager, made first appearance at Denver, Colorado, U.S.; has played, chiefly in comedies, at all leading London theatres; co-manager of Haymarket (1896-1905); built and was sole manager of the Playhouse (1907-15); has pub. *The Haymarket Theater*, 1903. Played in 'Grumpy' in 1922 and in 'If Winter Comes' in 1923.

MAUDE, SIR STANLEY (1864-1917), Brit. soldier. He was educated at Eton and Sandhurst, and joined the Coldstream Guards (1884); fought in Sudan (1885); brigade-major of brigade of Guards (1897-9); severely wounded in S. Africa (1899-1900); military secretary to gov.-gen. of Canada (1901-4); at War Office at various periods till 1912, latterly as assistant-director of the Territorial force; went to France (Aug. 1914), on staff of 5th Division, and given command of the 14th Brigade; severely wounded; on recovery sent to Gallipoli in command of 13th Division, being largely responsible for the successful evacuation of Suvla and of Helles; transferred to Mesopotamia, where he became by rapid steps commander-in-chief, and organized and executed the brilliant campaign leading up to the capture of Bagdad; died suddenly at Bagdad (Nov. 18, 1917) from cholera.

MAUD'HUY, LOUIS ERNEST DE (1858-1921), Fr. general; when the World War broke out held the rank of brigadier and was a prof. of strategy at the Ecole de Guerre. As a general of division he distinguished himself in the defense of the Grand Couronné of Nancy during the first battle of the Marne (Sept. 1914). Promoted to the command of the 10th Fr. Army, he took up a front between the Ancre and the Yser, and after a prolonged struggle (Oct. 20-25, 1914), succeeded in keeping the Germans out of Arras.

MAULE (35° 20′ S., 72° 20′ W.), maritime province, Chile, S. America; agriculture and stock-raising industries; capital, Cauquenes. Area 2474 sq. miles. Pop. 115,000.

MAULMAIN, MOULMEIN (16° 26′ N., 97° 45′ E.), capital of district Am-

herst, and of Tenasserim division, Lower Burma, on Salwin; exports timber, rice. Pop. 60,000.

MAUNA LOA, a volcano in Hawaii Is. It is about 13,660 ft. high and is still active. The crater of Kilauea is on its E. slope.

MAUNDY THURSDAY, in Holy Week precedes Good Friday. In Middle Ages custom grew up among rich to wash feet of poor (hence derivation from *mandatum*, (*i.e.*) the divine commandment given by Christ when He washed the disciples' feet).

MAUNOURY, MICHEL JOSEPH (1847-1923), Fr. general; *b.* Maintenon, Eure-et-Loir; joined the artillery; served in the Franco-Prussian War and was severely wounded at the battle of Champigny (Dec. 2, 1870); Officer of the Legion of Honor (1895); general of division (1901); artillery commander at Paris (1905); military governor of Paris (1910); achieved fame in the World War as commander of the secretly assembled 6th Fr. Army, which emerging from Paris, attacked the Ger. flank in the first battle of the Marne (Sept. 1914).

MAUPASSANT, HENRI RENÉ ALBERT GUY DE (1850-93), Fr. author; employed under Ministry of Marine and subsequently that of Public Instruction, but chief interests were sports and lit.; disciple of Flaubert, to whose Norman types he owed much; contributed to the *Soirees de Medan*, *Boule de Suif*, an episode of the Prussian occupation of Normandy, a bold and original story; so Rabelaisian in matter and frankness that sale of the *Une Vie*, 1883, was forbidden on railway book stalls, and caused a sensation at the time. In 1880 he had published *Les Vers*, but abandoned verse for the short story, of which he became a master.

MAUREPAS, JEAN FRÉDÉRIC PHÉLIPPEAUX, COMTE DE (1701-81), a French statesman; *b.* at Versailles. Succeeded his *f.* as Secretary of State of the King's Household in 1715, and in 1723 became Minister of Marine. In 1749 he offended Madame de Pompadour by an epigram, and was banished from Court. In 1774 he was recalled and made first minister; was a liberal patron of art and science.

MAURETANIA (34° N., 4° W.), an ancient country, N.W. Africa; corresponded to the modern Morocco and Western Algeria; was made a Rom. province by Claudius in 42 A.D.; invaded by the Vandals in 429 A.D. Modern M. is a protectorate in Fr. W. Africa, N. of Senegal. Area, 345,000 sq. miles. Pop. 250,000.

MAURICE (1521-53), Elector of Saxony. Elector John Frederick was defeated by Charles V. and M. at Mühlberg, 1547, and compelled to resign electorate to latter; M. refused to recognize *Interim*, 1548, and gathered troops against emperor; emperor driven to flight, 1552, and Treaty of Passau obtained; defeated Prince of Bayreuth at Sievershausen, 1553; ambitious, able ruler.

MAURICE, JOHN FREDERICK DENISON (1805-72), Anglican clergyman; *s.* of Unitarian minister; ed. Trinity Hall, Cambridge, and Exeter Coll., Oxford; ordained, 1834; prof. at King's Coll., London, 1840, and of Moral Philosophy at Cambridge, 1866.

MAURICE OF NASSAU (1567-1625), prince of Orange; Stadtholder of Holland and Zeeland, 1584; distinguished in war with Spain; secured Oldenbarneveldt's execution.

MAURICE, ST., traditional general who with his legion refused to persecute Christians at instigation of Maximinian, martyred with his soldiers, *c.* 286.

MAURITIUS (20° 10′ S., 57° 35′ E.), island, belonging to Britain, in Indian Ocean; has area *c.* 720 sq. miles; it is volcanic, and surrounded by coral reefs; surface consists of tableland, with mountains some 2000 ft. high in center N., center E., and S.W.; highest point Rivière Noire (2710 ft.) There are several volcanic lakes, of which Grand Bassin is largest. Temperature ranges from 60° to 100° Fahr., and hurricanes frequently occur between Dec. and April. Chief towns, Port Louis (capital), Curepipe, Mahébourg. Dependencies of M. are Rodriguez, and the Cargados Chagos, and Eagle Islands.

M. was first discovered by Portuguese in 1505; earliest settlements made in 1598 by Dutch, who remained till 1710, when they left the island; colonized by French in 1715, remaining in their possession till 1810, when it was taken by British, to whom it was formally ceded by *Treaty of Paris*, 1814.

Administered by governor, who is aided by executive and legislative councils. Railway mileage, *c.* 140. Pop. 1911, 375,000. See map, EAST INDIES.

MAURY, MATTHEW FONTAINE (1806-73), Amer. scientist; naval officer until lamed by an accident, 1839, devoted attention to conditions of navigation, and greatly contributed to knowledge of meteorology, etc.

MAUSER RIFLE. See RIFLE.

MAUSOLEUM, the name given by the Greeks to a sepulchral monument so named after Mausolus, king of Caria, to whom his wife Artemesia erected a monument which was considered the seventh wonder of the world. The term is now frequently applied to large sepulchres.

MAUSOLUS, Pers. gov. of Caria (377-353 B.C.).

MAUVE was first patented as a dye by Mr. Perkin in 1856. It was the first color obtained from aniline, being produced by treating it with chromic acid or the hypochlorites.

MAVROCORDATO, MAVROCORDAT, MAUROGORDATO, Italo-Gk. family residing in Gk. quarter of Constantinople. Alexander (*c.* 1636-1709), was chief dragoman of sultan; his descendants held important offices under Porte; greatest was Alexander (1791-1865), hero of War of Independence and Gk. statesman.

MAWSON, DOUGLAS (1882), an explorer and geologist; *b.* in Bradford, Yorkshire, England, who before leaving for exploring in the Antarctic was lecturer in geology in the university at Adelaide, Australia. He was appointed to the scientific staff on the expedition to the New Hebrides; to R. F. Scott's and Sir E. Shakleton's expeditions to the Antarctic.

MAXENTIUS, MARCUS AURELIUS VALERIUS, Rom. emperor, 306-12 A.D.

MAXIM, SIR HIRAM STEVENS (1840-1916), an Anglo-American inventor; *b.* in Sangerville, Me. He was brought up on a farm and at the age of fourteen was apprenticed to a carriage builder, subsequently finding employment in a laboratory in Boston. It was while in this latter position that he became interested in chemistry and physics and found his opportunity in that direction. He first perfected several inventions, one of these an improvement in incandescent lamps, which came into extensive use. Later, while a draughtsman in a shipbuilding firm in New York, he invented an improved locomotive headlight. In 1884 he perfected his automatic rifle, or machine gun, worked on the principle that the recoil of each shot gave the impulse to the force needed in throwing out the cartridge and loading for the next shot. The United States Government had not considered the device favorably, and Maxim presented it to the British Government, which adopted it, using the Maxim automatic rifle with great success in the Egyptian campaign. Later Maxim became interested in aeronautics, and in 1894 attempted to build an aeroplane. He was a naturalized British subject, being knighted in 1901.

MAXIM, HUDSON (1853), an American inventor and mechanical engineer; *b.* in Orneville, Me. He graduated from the Maine Wesleyan Seminary at Kent's Hill, then went into the printing and subscription publications business, in Pittsfield, Mass. Meanwhile however, he became interested in chemistry and mechanical engineering and began experimenting, as a result of which he invented smokeless powder. The patent for this invention he sold to the E. I. du Pont de Nemours Co., in whose employ he has ever since remained as consulting engineer and chief expert in the developing department. His invention was sold to the United States Government, in 1901, the formula being known as 'Maximite.' He continued perfecting many inventions in this same direction. Among his works are: *The Science of Poetry and the Philosophy of Language,* 1910; *Defenseless America,* 1915; and *Dynamite Stories,* 1916.

MAXIMA AND MINIMA (mathematical terms).—A function of a variable is said to be a maximum or minimum when it is the greatest or smallest value in a *series* immediately preceding and following that value.

MAXIMILIAN I. (1459-1519), Holy Rom. emperor; *b.* at Vienna; *m.* Mary of Burgundy, 1477; warred intermittently against France for possession of Burgundy and Netherlands; Ger. king, 1486.

MAXIMILIAN II. (1527-76), Holy Rom. emperor; *b.* at Vienna; Ger. king, 1562; king of Hungary, 1563; emperor, 1564.

MAXIMILIAN I. (1573-1651), 'The Great,' Duke of Bavaria; occupied Prot. city of Donauwörth for emperor, 1607, and helped to form Catholic league which fought with Prot. Union in Thirty Years War.

MAXIMILIAN I. (1756-1825), king of Bavaria; elector of Bavaria, 1799; helped Napoleon, and was constituted king as reward, 1806; kingship recognized by Allies on his desertion of Napoleon, 1813.

MAXIMILIAN, EMPEROR OF MEXICO (1832-67). See MEXICO (History).

MAXIMINUS, GAIUS JULIUS VERUS, Rom. emperor, 235-38 A.D.

MAXIMINUS, GALERIUS VALERIUS, Rom. emperor, 308-14.

MAXIMS, LEGAL, various axioms, general principles, or leading truths in law. 1500 are published in Bouvier's Law Dictionary. 'Caveat emptor' and 'Qui facit per alium facit per se' are two of the most familiar of these maxims.

MAXIMUS, name of four Rom. emperors; M. Clodius Pupienus Maximus, 238 A.D.; murdered. Magnus M., commander in Britain, 368; joint emperor with Valentinian II., 384-388. M. Tyrannus, erected by rebel army, 408; slain, 422. Petronius M., emperor 455, on murder of Valentinian III.

MAXIMUS, ST. (580-662), Gk. theologian; became monk at Chrysopolis on orthodox side in Monothelite controversy; mutilated for his belief.

MAX - MÜLLER, FRIEDRICH (1823-1900), Anglo-Ger. Orientalist; *b.* Dessau; *d.* Oxford; made a special study of Sanskrit, and, coming to England, where he permanently settled, was commissioned by the East India Company to edit the *Rig-Veda.* He was first Taylorian prof. of Modern Languages at Oxford, and later prof. of Comparative Philology.

MAXWELL, JAMES CLERK (1831-79), Scot. physicist; *b.* and ed., Edinburgh; second wrangler; fellow of Trinity, Cambridge; prof. at Aberdeen, King's Coll. (London), and ultimately Cambridge, where he *d.*; elected Fellow, Royal Soc. (1864); developed Faraday's ideas in mathematical form; wrote: *Electricity and Magnetism* (considered *Principia* of subject), *Theory of Heat, Matter and Motion,* and important papers in philosophical publications.

MAXWELL, RT. HON. SIR JOHN GRENFELL (1859), British soldier; joined army (1879); served at Tell-el-Kebir and in Nile Expedition (1884-5), took part in most of the fighting on Egyptian frontiers (1886-96), and commanded 2nd Egyptian Brigade at battle of Omdurman; served in S. African War, and was military governor of Pretoria (1900-1); commanded the forces in Egypt (1908-12), and again in 1914-15, when he took rapid and effective means to repulse attacks of Turks; was commander-in-chief, Ireland (1916), and commander-in-chief of the northern command (1916-19).

MAY, 5th month of year, is associated with rejoicing; cf. 'bringing home the May,' 'Queen of the May.'

MAY, PHIL (1864-1903), Eng. black-and-white artist; great humorist in sketches of London East End types; excellence of drawings lies in economy of pen lines.

MAY, SAMUEL (1810 - 1899), an American abolitionist; *b.* in Boston. He was pastor of a Unitarian church for many years and was general agent of the Anti-Slavery Society of Massachusetts and of the American Anti-Slavery Society. He was one of the most conspicuous of the New England abolitionist.

MAY, SIR THOMAS ERSKINE, BARON FARNBOROUGH (1815-86), a constitutional jurist. In 1844 he published *A Practical Treatise on the Law, Privileges, Proceedings, and Usage of Parliament* (10th ed. much enlarged, 1893), a learned work which has been translated into German, French, Italian, Spanish, Japanese, and Hungarian. He was examiner for private bills and taxing-master for both Houses of Parliament, 1847-56, and clerk of the House of Commons, 1871-86. Besides the work mentioned above he published *The Constitutional History of England since the Accession of George* III., and *Democracy in Europe: A History.*

MAYAGUEZ (18° 13′ N.; 67° 4′ W.), seaport, Porto Rico, on W. coast; exports sugar, tobacco, coffee. Pop. 17,000.

MAYAS, dominant race of Yucatan when America was discovered and for many centuries previous. Some of their ruins date back to about 450 A.D. and others are thought by archaeologists to antedate the Christian era by about a century. Where they came from originally has not been ascertained, but there are traces of two distinct invasions, one coming by way of the Gulf of Mexico and the other from the southwest by land. What is certain is that they founded a great and splendid civilization, the ruins of which still arouse the wonder and admiration of explorers. There still exist remains of magnificent temples, pyramids, plazas and roads that reveal an advanced stage of architectural development. Their culture and religion had many things in common with the neighboring states of Chiapas, Honduras, Guatemala, Oaxaca, Guerrero and Campeche. A century and a half of civil war that seems to have existed from the end of the 13th century until about 1460 brought the country close to the verge of ruin, and this was completed at the time of the Spanish conquest when the survivors of the Maya race were forced to seek refuge from the invaders in the mountains and the deeply wooded western

coastland. Here they maintained a quasi-independence during the three centuries of Spanish rule, and it was only during the dictatorship of Porfirio Diaz that they were finally reduced to subjection. The Maya tongue is still spoken by about 300,000 people.

MAYAVARAM (11° 6′ N., 79 —′ E.), town, on Cauvery, Tanjore, Madras, India; fine cloth manufactures. Pop. 24,000.

MAYEN (50° 20′ N., 7° 11′ E.), town, Rhineland, Prussia; textile industries. Pop. 15,000.

MAYENNE (48° 19′ N., 0° 39′ W.), department, France; formed from parts of ancient provinces, Maine and Anjou; surface varied and well wooded; chief stream, the Mayenne; principal industries, agriculture, stone-quarrying, manufacture of coarse textiles; capital, Laval. Pop. 300,000.

MAYENNE, CHARLES OF LORRAINE, DUKE OF (1554-1611), of family of Guise; became head of anti-Huguenot League; made lieut.-gen. of kingdom, and prevented capture of Paris by Henry IV.; on death of Charles X. agreed to accession of Henry IV.

MAYER, ALFRED MARSHALL (1836-1897), an American physicist. Professor of physics at Stevens Institute of Technology, Hoboken, N. J. from 1871 until his death. Contributed largely to scientific journals. Wrote *The Earth A Great Magnet*, 1872; *Light*, 1877; *Sound*, 1878; *Researches in the Roentgen Rays*, 1896.

MAYFIELD, a city of Kentucky, in Graves co., of which it is the county seat. It is on the Illinois Central railroad. Its industries include clothing factories, tobacco factories, etc. Pop. 1920, 6,583.

MAY FLOWER, the common name, in the United States, of the trailing arbutus, a plant with rose colored blossoms, found chiefly in New England. It is also sometimes called ground laurel.

MAYFLOWER, the name of a small ship famous in history as the vessel which brought the first company of the Pilgrim Fathers to the shores of North America. The Pilgrims were a portion of an English colony in Holland, the members of which had fled from England on account of persecution which they suffered because of having separated themselves from the established Church of England. Early in 1620 they acquired their first vessel, the Speedwell, and in this a group of them embarked for America, in July. They were compelled to put back on account of contrary and heavy winds, and the bad condition of the ship. Later the Mayflower was acquired, and in September 102 members of the colony set sail for Virginia, where they had permission to establish a community of their own. Heavy southerly storms drove them northward, and they sighted land near Cape Cod, and on December 22, 1620, they landed at Plymouth. When they had definitely decided to settle here, a compact was drawn up in the cabin of the vessel, whereby a rude form of government was agreed upon, this document being later known as the Mayflower Compact, and being often described as the first written constitution in the world.

MAYFLOWER DESCENDANTS, SOCIETY OF, a patriotic society, established in New York in 1894. Only lineal descendants of the Pilgrims who came over on the Mayflower are eligible for membership. Its object is to preserve the memory and records of the Pilgrims.

MAYNARD, a town of Massachusetts, in Middlesex co. It is on the Boston and Maine railroad and on the Assabet river. Its industries include woolen and powder mills. Water power is furnished by the river. Pop. 1920, 6,390.

MAYNARD, GEORGE WILLOUGHBY (1843-1923), an American artist; *b.* in Washington. He studied art in New York City and in Antwerp. For many years he had a studio in Paris and afterwards opened one in New York City. He was especially noted for his mural decorations, which include work on the ceiling of the Metropolitan Opera House and the court-house of the Appelate Division, in Madison Square, New York. He also painted a remarkable series of panels in the Library of Congress, in Washington, and specimens of his work are in the Boston Public Library and in the Columbia University Library. He received many medals from art organizations and from expositions. He was a member of the National Academy and other art societies.

MAYNOOTH (53° 24′ N., 6° 33′ W.), town, Kildare, Ireland; seat of R.C. coll. for education of priests, founded 1795.

MAYO (*c.* 53° 50′ N., 9° W.), county of Connaught, N.W. coast, Ireland; was practically independent under de Burgh family till Elizabeth's reign. Bounded by Sligo, Roscommon, Galway, Atlantic; area, 2156 sq. miles; mountainous in W., flat in E.; coast much in-

dented; drained by Moy; contains Lough Conn and other lakes; chief towns, Castlebar, Ballina; cattle-rearing, salmon and other fisheries, linen-weaving; small deposits of coal, slate. Pop. 191,969.

MAYO, CHARLES HORACE (1865), an American surgeon; *b.* in Rochester, Minn. He graduated from Northwestern University and received his M.D. degree from the Chicago Medical College, in 1888, then began to practice in his native city. He and his *brother* William James Mayo (*q.v.*), donated $2,000,000, in 1915, to establish the Mayo Foundation for Medical Education and Research, at Rochester, in affiliation with the University of Minnesota. Since then he has been professor of surgery in this institution. During the war against Germany he served in the U.S. Army Medical Corps, with the rank of Colonel.

MAYO, HENRY THOMAS (1856), an American naval officer, *b.* in Burlington, Vt. He graduated from the Naval Academy, at Annapolis, in 1876, and then served through the various grades, reaching the rank of rear-admiral in 1913. He was commander-in-chief of the Atlantic Fleet during the entire period of the war with Germany, which included all the vessels in the Atlantic and European waters. He represented the United States at the naval conference of the Allies in London, in September, 1917. From January until June, 1919, his command was designated as the United States Fleet. He was retired on account of age, in 1920.

MAYO, RICHARD SOUTHWELL BOURKE, 6TH EARL OF (1822-72), Sec. for Ireland, 1852, etc.; Viceroy of India, 1869, where he was murdered.

MAYO, WILLIAM JAMES (1861), an American surgeon, *b.* in Le Sueur, Minn. He graduated from the medical department of the University of Michigan, in 1883, then began to practice in Rochester, Minn. Together with his brother, Charles Horace Mayo (*q.v.*) he donated $2,000,000 for the establishment of the Mayo Foundation for Medical Education and Research, in 1915. During the war with Germany he was chief consultant for surgical service in the United States Army Medical Corps, with the rank of colonel.

MAYOR, the name usually given to the chief magistrate of a city or corporate town. The word is derived from the Latin *major*. In the large cities of Eng. and Ireland this magistrate is entitled Lord Mayor; in Scotland the chief magistrate of the city is called Provost. In the United States the mayor is usually elected by the people for a number of years, but since the adoption in many cities of the commission form of government, this office has been abolished or the mayor performs merely nominal duties.

MAYOR OF THE PALACE, great official among the Franks of the Merovingian era. He was chief administrator of the king's household and adviser to the court.

MAYOTTE (12° 52′ S., 45° 13′ E.), one of the Comoro Islands, in Mozambique Channel; since 1843 Fr. possession. Area, 140 sq. miles. Pop. 10,000.

MAYSVILLE, a city of Kentucky, in Mason co., of which it is the county seat. It is on the Louisville and Nashville, and the Chesapeake and Ohio railroads, and on the Ohio River. Its industries include cotton mills, flour mills, sawmills, shoe factories, cigar factories, and flour works. It is the seat of several girls' academies and has two libraries. Pop. 1920, 6,107.

MAYWOOD, a town of Illinois, in Cook co. It is on the Chicago, Great Western and other railroads, and on the Des Plaines river. Its industries include steel works and tin plate works. It is the seat of the German Lutheran Theological Seminary, and of homes for old people and crippled children. Pop. 1920, 12,072.

MAZAMET (43° 39′ N., 2° 19′ E.), town, Tarn, France; cloth manufactures. Pop. 14,000.

MAZANDARAN (36° 30′ N., 53° E.), province, N. Persia, between Caspian Sea on N. and Elburz Mts. on S.; mostly level; partly jungle and partly under cultivation; unhealthy climate; yields rice, cotton, sugar, fruits; administered by a governor; capital, Sari. Area, 10,460 sq. miles. Pop. 200,000.

MAZARIN, JULES (1602-61), cardinal; an Italian by birth; ed. in Rome and Spain and fought in war of Valtelline; showing capacity for diplomacy, entered service of Louis XIII., 1639, as Richelieu's *protege*; cardinal, 1641; on Louis' death, minister of the queen, Anne of Austria; became chief statesman of France; the troubles of the Fronde were partly due to him; greatly increased the power of France in Europe, and himself left a large fortune, but did little for the internal condition of the country; one of the cleverest statesmen of the XVII. cent.

MAZARINE BIBLE, an edition of the Latin Vulgate, discovered in the library of Cardinal Mazarine. Form

this edition John Guttenberg printed the first book in which metal types were employed.

MAZAR-I-SHARIF (36° 45′ N., 67° 9′ E.), town, Afghan Turkestan, with fortress of Takhtapul. Pop. 23,000.

MAZARRON (37° 35′ N., 1° 20′ W.), town, Murcia, Spain; iron and lead mines. Pop. 25,000.

MAZATLAN (23° 11′ N., 106° 23′ W.), seaport, Sinaloa, Mexico, on Pacific; exports hides, gold, silver. Pop. 19,000.

MAZEPPA, MAZEPA-KOLEDINSKY, IVAN STEPHANOVICH (*c.* 1644-1709), hetman of the Cossacks; was page to John Casimir, king of Poland. As punishment for a court intrigue he was bound naked to a wild horse, but escaped death. His plot against Peter the Great failed.

MAZURKA, dance popular in Poland and Germany; four or eight couples participate. The music is noticeable because of its uncommon rhythm.

MAZZARA DEL VALLO (37° 42′ N., 12° 34′ E.), walled city, Trapani, Sicily; sulphur springs; oil, linseed. Pop. 20,000.

MAZZARINO (37° 17′ N., 14° 15′ E.), town, Caltanissetta, Sicily; sulphur springs, wine. Pop. 16,000.

MAZZINI, GIUSEPPE (1805-72), Ital. patriot of Genoese family; founded *Indicatore Genovese,* 1828; imprisoned, 1830; exiled and, settled in Marseilles; invasion of Savoy failed, 1834; M. fled to Switzerland, and in 1836 to London; watched with great suspicion by Brit. government; returned to Italy, 1848, and became dictator at Rome as one of triumvirs, 1849; vainly opposed surrender of Rome to French; returned to England, 1850, and became heart of conspiracies against Austria; opposed action of Garibaldi and Cavour, 1859-60.

MEAD, liquor made by fermentation of honey; very popular in Europe, especially among Anglo-Saxons, till displaced by wine.

MEADE, GEORGE GORDON (1815-72), an American soldier, *b.* in Cadiz, Spain. He graduated from West Point Military Academy, in 1835, served through the Seminole War and the Mexican War, became a civil engineer in civil life, then entered the Federal Army at the outbreak of the Civil War as brigadier-general of Volunteers. Throughout the war he was attached to the Army of the Potomac, of which he had command in the summer of 1863, commanding the Union forces at Gettysburg. In 1864 he was made a major-general of the regular U.S. Army.

MEADVILLE, a city of Pennsylvania, in Crawford co., of which it is the county seat. It is on the Bessemer and Lake Erie, and the Northwestern Pennsylvania railroads, and on the Venango river. Its industries include iron works, a furniture factory, tool factory, machine shops, flour mills, etc. It is the center of an important agricultural and oil producing region. It is the seat of the Allegheny College and the Meadville Theological Seminary. It has a library and two hospitals. Pop. 1920, 14,568.

MEAGHER, THOMAS FRANCIS (1823-67), an Irish-American soldier, *b.* in Waterford, Ireland. In his youth he was associated with the Young Ireland Party, in connection with which he was arrested, found guilty of treason and transported to Tasmania, in 1848. In 1852 he escaped to the United States where he studied law and began to practice in New York City. During the Civil War he organized the Irish Brigade, which he commanded at the Second Battle of Bull Run, Fredericksburg, Antietam and Chancellorsville. After the war he was Secretary of Montana Territory.

MEAN, in math., used to denote a term intermediate in value between two terms of a series.

MEASLES, an infectious fever, characterized by catarrh of the respiratory passages and by the appearance on the skin of a red eruption. The disease is in all probability caused by a specific micro-organism which has not yet been discovered, and infection is conveyed by the breath, secretion of the nasal passages, and by articles which have been in contact with an affected individual. The incubation period is about ten to fourteen days, and fever comes on suddenly, accompanied by running at the nose and eyes, while characteristic whitish spots, *Koplik's spots,* are found on the mucous membrane just inside the angle of the mouth; the eruption appears on the fourth day as raised, red spots, running together in irregular crescentic patches, usually appearing first on the face and neck, spreading downwards over the whole body, and disappearing gradually by the seventh day, the temperature also falling.

MEASUREMENT OF TIME. See CHRONOLOGY.

MEASURES, see WEIGHTS AND MEASURES.

MEAT INDUSTRY. See PACKING INDUSTRY.

MEATH (53° 40′ N., 6° 40′ W.), maritime county, Leinster, Ireland, on Irish Sea; area, 906 sq. miles; surface level and undulating; traversed S.W. to N.E. by the Boyne; fertile, but almost entirely under pasture; abounds in relics of Irish antiquity; capital, Trim. Pop. 64,920.

MEAUX, tn., Seine-et-Marne, France (48° 57′ N., 2° 52′ E.), 25 m. E.N.E. of Paris; has 12th cent. cathedral; trade in cheese, corn, eggs, and poultry, and manufactures flour, sugar, cotton, and steel. Pop. 13,600. The town was devastated by shell-fire of Germans during their advance towards Paris, Sept. 1914.

MECCA, nominal cap. of Arabia (20° 21′ N., 40° E.); sacred city of Mohammedans; is mentioned by Ptolemy as Makoraba, and before the time of the Prophet was held by the Kosaites and Koreish in succession; Mohammed was born here about 571; he was compelled to flee in 622, returned and captured the city in 627. Mecca was besieged by Hosein in 682, and fell to Abdul Melek in 692; remained for many years in hands of caliphs; pillaged by Karmathians in 930, when the black stone was removed by the invaders, who retained it until 952; under sway of Fatimites, Ayyubites, and Mamelukes in succession, and came eventually to the sultans of Turkey by conquest in 1517. Captured in 1803 by Wahabis, who were driven out by Mehemet Ali, pasha of Egypt, in 1818, since when Turkish authority has at least nominally endured till June 5, 1916, when Hussein Ibn Ali, high sherif of Mecca, headed a revolt of the Hejaz, proclaimed his independence, and in same year assumed title and office of King of the Hejaz. One of the most important events of recent years was construction of Hejaz railway, uniting Mecca and Damascus. Burckhardt and Burton were among the few Christian Europeans who succeeded in entering Mecca.

The principal building is the Great Mosque, in the center of which is the Kaaba, a small oblong building containing the sacred black stone towards which all Moslems turn in worship, and to which all are expected to make at least one pilgrimage. According to Mohammedan tradition this stone was originally white, its present black color being due to the tears shed for sin by the vast crowds of pilgrims who visit it annually. The Kaaba is regarded with great reverence; it is usually covered by a black curtain, and is opened for worship on three occasions only during the year. The Great Mosque also contains univ. hall and library, and has seven minarets. Mecca is the most holy city of the Moslem world, and was a religious city long before time of Mohammed. Trade in pottery and souvenirs for pilgrims. Pop. 80,000.

MECHANICAL ENGINEERS, AMERICAN SOCIETY OF, an organization of engineers specializing in the generation and utilization of mechanical power and mechanical processes of manufacture. It was formed in 1880 in New York City, and since that time has held two meetings every year; one meeting is held each year in New York and another in some important city of the Union. At these meetings, papers are read by men eminent in the profession, and these papers together with the discussions to which they give rise, are published in an annual volume. Beside this yearly volume, the society issues a monthly periodical called the Journal, which is devoted to literature of value to the profession both at home and abroad. The organization has a most valuable library of over 70,000 volumes. The society is governed by a council consisting of a president, six vice presidents, nine managers, a secretary and a treasurer. Apart from its value to its individual members, the society has contributed largely by its suggestions to plans for public welfare and civic betterment. The membership in 1923 was 17,000.

MECHANICS. The term mechanics is applied to the theory of mechanisms. The science which treats of force and its action upon bodies is called dynamics; and since force may be considered as acting in one or other of two distinct ways, there is a corresponding division of the science into branches.

The science of mechanics may be divided broadly according to the following scheme:

Mechanics
- Rigid Bodies
  - Kinematics.
  - Statics.
  - Dynamics.
- Fluid Bodies
  - Hydro-mechanics.

Dynamics.—The principles of this subject have been dealt with more theoretically under DYNAMICS. Mention may be made of a few of the more important definitions and units which apply to the practice of mechanics. A moving body describes a certain length of path in a certain time.

As the sense of sight gives us an idea of motion, so the sense of touch supplies a perception of force, of which the muscular senses give a rough measure. The conception of mass can be derived from that of force. The mass of a body is defined by the force required to

produce a given acceleration, and so *force* (F) is measured by the product of the acceleration (*a*) and the mass (M) of the body on which it acts, or $F=Ma$.

Work, or *energy*, is defined as the product of a force into the distance (L) the force moves its point of application, so that, in terms of fundamental units,

work or energy $=FL=MaL=\frac{ML^2}{T^2}$

Momentum is the product of the mass of a body into its velocity.

Inertia, the most important conception of kinematics, is that property of a body which tends to resist motion when at rest, and, when in motion, to resist the action of external implied forces.

Statics.—Statics is that branch of mechanics which investigates the conditions of equilibrium of bodies. It is based on the principle of the balancing of forces. Since forces possess both magnitude and direction, they can be represented by straight lines. The *moment of a force* is the product of the force into the perpendicular distance of the line of action of the force from any given point of reference. This product is called the moment of the force about that point. To ensure equilibrium, the moments of the forces about each and every axis must be zero. The fundamental theorem in statics is the parallelogram law of forces. If two forces be represented by two straight lines, they can be replaced by a resultant force, represented by the diagonal of the parallelogram determined by the two lines.

This fundamental theorem is amplified and applied to systems of bodies and forces, so that the statical solution of a problem deals with the resultant of systems of forces, or conversely when necessary the resolution of a force into components or subsidiary forces.

The statical definition of a moment leads to the explanation of the *moment of inertia* of a body. Conceiving a body to consist of a large number of particles, the moment of inertia is the product of the mass of each into the perpendicular distance from a given axis. The sum of all these products is the moment of inertia about that axis. From the definition of the moment of inertia it is evident that there is a distance (K), such that $I=MK^2$, where I=the moment of inertia, and M=mass of body.

The distance or line K is called the *radius of gyration* with respect to that axis, and may be defined as the distance from that axis at which the whole mass of a body can be concentrated without any change in the moment of inertia. Thus the moment of inertia is a mechanical quantity, while the radius of gyration is a distance.

The modern vector theory, or graphic statics, and its representation of forces by straight lines, reduce the mathematical calculation of stresses and forces acting upon a structure to a more mechanical and rapid solution by geometrical drawing with accurate results. Graphic statics is indispensable to modern practice.

Applied Mechanics.—The application of mechanics can be divided into two classes:

(*a*) Fixed machines or structures; (*b*) moving machines or mechanisms.

Theory of Structures.—The whole theory of structures is an application of the principles of mechanics, especially statics, to the considerations of equilibrium resulting from the resistance of structures to externa applied forces. The various parts which go to form a structure are called pieces or members: such are the stones in an arch or the girders of a bridge.

There are two types of structure:

(1) Framed structures, the members or pieces of which are subject to direct compression and tension only;

(2) Structures the members of which are subject to bending as well as to compression.

Speaking broadly, the theory of structures may be divided into three distinct operations:

(*a*) A calculation of the stability of a structure;

(*b*) A determination of the stresses upon and in the materials of the structure;

(*c*) A design of the member according to scientific principles.

The last does not come under the category of mechanics. The first and the second involve a practical use of the principles of statics and dynamics.

MECHANICSVILLE, a town of New York, in Saratoga co. It is on the Boston and Albany railroad, and on the Hudson river. Its industries include the manufacture of sashes, blinds, paper boxes, fibre, knitted goods, mattresses, etc. It has several handsome public buildings. Pop. 1920, 8,166.

MECKLENBURG (53° 5′ to 54° 23′ N., 10° 31′ to 13° 52′ E.), two former grand-duchies, N. Germany (M.-Schwerin and M.-Strelitz), at W. end of Baltic, along which there is coast-line of *c.* 66 miles; surface flat, with low ridge in center; area, 6199 sq. miles; produces cereals, amber; manufactures beet-sugar, beer, spirits, leather; famous for merino sheep, cattle, pigs, horses. M. was conquered by Wallenstein in 1628; after various changes the two existing duchies were established in 1701, while

grand-ducal title dates from 1815. M.-Schwerin has area 5068 sq. miles; capital, Wismar; largest towns, Rostock, Schwerin. Pop. 715,000.

M.-Strelitz has area 1151 sq. miles; capital, New Strelitz; sends one representative to Bundesrath, and one to Reichstag. Pop. 110,000.

MECKLENBURG DECLARATION, The Resolutions adopted May 20, 1775 at a convention at Charlotte, Mecklenburg County, North Carolina, each militia company of the county being represented. The resolutions declared that the people of Mecklenburg County were free and independent of the British Crown, the general tenor of the Declaration and many of the phrases being the same as the Declaration of Independence. In 1831 May 20 was made a legal holiday in North Carolina. See Hoyt *The Mecklenburg Declaration.*

MECONIC ACID, an acid formed by the combination of morphia and opium. In solution with water it forms a deep red color.

MEDAL (Low Lat. *medalia,* from *metallum,* 'metal'), a piece of metal, shaped more or less like a coin, stamped with image and inscription, and struck to commemorate some event or to honor some person.

Three classes of medals are notable: (1) the religious medal of Christian devotion; (2) the commemorative medal, struck particularly at commencement of new reigns, and dating from the Renaissance; (3) the decorative medal, awarded for eminent services, not brought into general use before the end of the 18th cent., but now of wide popularity.

(1) The *religious* medal worn by Catholics recalls mysteries of faith, and inculcates lessons of piety, and serves either as the badge of a guild or for the consecration and protection of the wearer. It was not till the 15th cent. that religious medals were fashioned with any real beauty. From that time they have been struck in great numbers for various purposes.

(2) The *commemorative* medal had its first great artist in Vittore Pisano, 1380-1456, the painter of Verona. The beauty of his work done by casting, the *cire perdue* process, has never been quite surpassed. In the following century a return was made to minting by engraved dies, and Benvenuto Cellini executed some fine pieces in that manner. Albrecht Dürer was also a distinguished medallist, and Nuremberg was a famous center of the art. In France, Jacques Primavera, Germain Pilon, and Georges Dupré were the chief workers. In England it was not till Elizabeth's reign that medals were the work of native artists, and at first these were not of outstanding merit. During the next two reigns Abraham and Thomas Simon executed some of the finest Eng. medals. From that time till the latter part of the 19th cent. native talent was of but little account, but a revival set in about 1870, and the art regained real artistic qualities within its own limitations. In the 15th cent. the custom began of sovereigns inaugurating their reign and celebrating its chief events by the issue of medals. Hence we have the long series of papal medals, commencing with that of Pope Paul II. (1464-71) and of Eng. coronation medals, beginning with Henry VIII. For modern medals and decorations, see DECORATIONS, MILITARY.

MEDAL OF HONOR LEGION, association composed of officers and men of the United States army on whom have been conferred honor medals for acts of distinguished heroism. It includes the navy as well as the army, and although at first it was a society of medal winners in the Civil War, the scope of the organization has been extended to include all who have won the honor in any war waged by the Republic. Meetings are held annually. The present membership is about 400.

MEDAL OF HONOR, UNITED STATES MILITARY, decoration bestowed on army and navy officers and men for some act of valor outside the limits of mere obedience to duty. It is a reward given to a man who for the moment has become a superman and braved dangers that he was not expected to brave and overleaped barriers that seemed to be insur ountable. It was outside the call of duty; no one expected him to do it; no officer would have commanded him to do it. For such phenomenal heroism the medal is bestowed. The authorization for the medal was given by Act of Congress in 1862. The decoration consists of a five-pointed star within a circle, suspended from a cross-bar inscribed with the word 'Valor' and surmounted by an eagle, united by a ribbon of 13 stripes of red, white and blue. The navy has its own distinctive Medal of Honor.

MEDEA (classical myth.), famous sorceress, who helped Jason to obtain the Golden Fleece. Euripides made a tragedy and Cherubini an opera out of her story.

MEDELLIN (6° 2′ N., 75° 49′ W.), city, Colombia; bp.'s see; educational and commercial center; goldmining industries. Pop. 70,000. Department of Medellin has area of 12,137 sq. miles. Pop. 275,000.

MEDFORD, a city of Massachusetts, in Middlesex co. It is on the Boston and Maine Railroad, and on the Mystic River. Its industries include brick yards, machine shops, fire works, boot and shoe factories, and carriage factories. It is the seat of Tufts College and has a high school and a public library. It is notable for the Craddock House, which is said to be the oldest building in the United States. Pop. 1920, 39,038.

MEDFORD, a town of Oregon, in Jackson co. It is on the Southern Pacific and other railroads. It is the center of an extensive agricultural region and has large refining works. It is the seat of the United States Weather Bureau Station. Pop. 1920, 5,756.

MEDIA (*c.* 35° N., 48° E.), ancient country, Asia, between Caspian Sea and Parthia on E., and Armenia and Assyria on W., and now included in Persian province of Iran (*q.v.*). M. was subject to Assyria in early times; said to have attained separate existence under Deioces, *c.* 710 B.C.; became powerful kingdom under Phraortes, who conquered Armenia and Persia, and Cyaxares, who took Nineveh and destroyed Assyrian empire, *c.* 606 B.C. In next reign Persia rose in revolt, and King Astyages was deposed by Cyrus, who founded Persian empire, of which M. remained part until whole was conquered by Alexander of Macedon, *c.* 330 B.C. After Alexander's death, greater part was included in Syrian kingdom, subsequently M. formed part of Parthian empire, and was eventually united to Persia under the Sassanids, *c.* 226 A.D. The northern part of M., known as *Atropatene,* became an independent kingdom after death of Alexander; after various changes became part of second Persian empire, *c.* 226 A.D.

MEDICAL ASSOCIATION, AMERICAN, organization founded in Philadelphia in May 1847. The objects of the association, as stated in its constitution, are to promote the science and art of medicine, safeguard the interests of the medical profession, elevate the standard of medical education and foster friendly intercourse among American physicians. The association holds annual sessions, which are attended by delegates representing state associations, who transact the business and frame the policies of the organization. Eminent members of the profession who qualify as Fellows meet as a scientific assembly for the discussion of scientific subjects. There are fifteen sections, each devoted to some special branch of medicine, and papers are read and discussions held regarding these special subjects. The membership in 1923 was 89,481.

MEDICAL EDUCATION the first medical school in America was established in 1765 when the Philadelphia College opened a medical department. Previous to that time doctors took apprentices who in turn set up in business for themselves. Those who could afford it went to Europe to secure a medical education. King's College New York opened the second medical school in 1768, and conferred the first degree Doctor of Medicine on Robert Tucker in 1770. The Revolution disorganized medical education but many schools were opened after the peace. Harvard had a medical faculty in 1783; Dartmouth in 1797; the University of Maryland in 1807 and Yale in 1810. By 1840 there were 32 medical schools in the country. In that year the College of Physicians and Surgeons at Fairfield New York had 3000 students on its rolls. Between 1776 and 1876 there were 80 medical schools established. They increased too rapidly for the population and to keep going shortened the time of study, and lowered their standards. The American Medical Association was founded to improve the quality of students by insisting on better preliminary education, and three terms of 8 or 9 months. In 1878 Dr. Francis Delafield established the first laboratory in connection with the College of Physicians and Surgeons, New York. The founding of Johns Hopkins Medical School in 1893 marked a great advance, when the medical course was made four years, and students were required to have a Bachelor degree to enroll. The Woman's Medical College of Pennsylvania was founded in 1850. Johns Hopkins offered the same privileges to women as to men. During the World War medical schools were under government control and converted into Students Army Training camps. In 1922 there were 68 colleges reporting. Students enrolled, four years, 15,430.

MEDICAL JURISPRUDENCE, etc.; see MEDICINE.

MEDICI FAMILY, Ital. house, to which belonged many great Renaissance statesmen, ecclesiastics, and patrons of culture. Origin of family is unknown; appears in Florentine history in XII. cent.; first important member Salvestro, who started Medicean opposition to great family of Albizzi by aiding revolt of populace against greater gilds, 1378. Giovanni (1360-1429) founded the family wealth by establishing banks in numerous cities, and won popularity as defender of poor against the Albizzi, etc.

His son Cosimo (1389-1464) started the literary tradition of his house and heaped up wealth, but Albizzi secured his banishment, 1433; war with Milan and low finances made Cosimo's recall necessary; Albizzi and most of great families were permanently expelled, and Medici were henceforth supreme in Florence. He employed Brunelleschi, Donatello, Ghiberti, etc., collected MSS., and established public libraries; of great importance in history of Renaissance.

His son and successor, Piero, *d.* 1469, crushed plot against family; terribly afflicted by gout and rheumatism; left son, Lorenzo, 1449-92, most famous of house, known as *The Magnificent.* Lorenzo is one of most brilliant and mild of despots of history; universally gifted (except as to good looks) and of lordly generosity, won enthusiastic affection of Florence, but had to face republican plot; assassins slew his bro., 1478, but failed to kill Lorenzo; republican institutions retained, but Lorenzo became virtual tyrant and sole conductor of foreign policy.

Successor, Pietro, 1471-1503, was deposed for submission to French, 1494. Lorenzo's second *s.*, Giovanni, 1475-1521, became pope, 1513, as Leo X.; patron of letters and art, employing Raphael to decorate Vatican, but unwisely assisted Emperor Charles V. against France, and prepared way for Papacy to become tool of empire. Pietro's son, Lorenzo, 1492-1519, re-established Medici rule in Florence, but was not absolute like his grandfather; his dau. Catherine, 1519-89 m., 1533, Duke of Orleans, afterwards Henry II. of France (see CATHERINE DE' MEDICI). On Lorenzo's death, 1519, Cardinal Giulio de' M., an illegitimate son of the house, assumed government of Florence; he became pope as Clement VII., 1523, suffered sack of Rome by imperial troops, 1527, and fell into emperor's power. Medici were expelled from Florence, 1527, but restored by papal and imperial forces, 1530. Illegitimate Alessandro de' M., vicious and cruel, was appointed by emperor duke-in-fee, 1531, and established new constitution, 1532; plots to restore republic led by another bastard Medici, Cardinal Ippolito, poisoned probably by Alessandro, 1535; Alessandro, last of elder branch, was murdered.

Cosimo, descendant of younger branch, succeeded, and started rule by stamping out revolt with great cruelty; ruled as able but terrible despot; conquered Lucca, Siena, and Montalcino, and became first grandduke of new state, Tuscany, 1567, by creation of pope; Tuscany was ruined by his taxation. He was succeeded, 1574, by son Francesco, I., who won imperial recognition for his archduchy, continued ruin of country by taxation, and neglected government, while dabbling in lit. and science; founded Uffizi Gallery, etc.; constant poisonings, murders, and intrigues. His dau. Maria married Henry IV. of France (see MARIE DE' MEDICI). His bro. and successor, Ferdinand I., founded Villa Medici at Rome, and presented art treasures to Florence, drained marshes and improved communications, and greatly developed Tuscany. Son, Cosimo II. (duke, 1609-21), died at age of thirty; young son, Ferdinand II. 1621-70, was a weak ruler, tyrannized over by Church, but patron of science and lit.; succ. by son, Cosimo III. 1670-1723, even feebler and devoted to pleasure; surviving son, Giovan Gastone, was childless, and Powers refused to allow Cosimo either to bequeath succession to sister, or to restore Florentine republic; Giovan Gastone, 1723-27, a hopeless invalid. Duke of Lorraine succeeded. M. rule was fatal to Tuscany. See FLORENCE.

MEDICINE, MODERN HISTORY OF. In 1628 William Harvey published his views on the circulation of the blood, and thus revolutionized medicine. In the same year was born Malpighi, who in 1661, by means of the microscope, demonstrated the passage of blood from arteries to veins through the capillaries. From 1628 modern medicine may be said to take its rise. By the discovery of vaccination Jenner almost eradicated the scourge of smallpox; and he prepared men's minds for the ideas of Lister, Pasteur, and Koch, whose germ theory threw a new light upon many diseases, and led not only to better methods of cure, but to hygienic measures for the prevention of infection. After Jenner's time the two most important events in medical history are the introduction of anæsthetics and the development of antiseptic principles. Equally far-reaching was Lister's great work, which transformed hospitals from hotbeds of disease into clean, germ-free sanatoria. About the middle of the 19th cent. a second Renaissance may be said to have begun in the scientific world. Virchow published his great work on cellular pathology; Darwin promulgated ideas that have influenced all scientific thought; Koch improved the methods of bacteriological research; Pasteur investigated the problems of fermentation, and Lister applied Pasteur's results to surgery. At the same time medical men began to use more accurate instruments and methods of diagnosis. In 1816 Laennec invented the stethoscope, and a little later the value of the clinical thermometer, the microscope, the oph-

thalmoscope, and the laryngoscope came to be widely recognized. More recently still, success has followed efforts to combat by antitoxin treatment many of the diseases due to germs, especially diphtheria. Koch's discovery of the tubercle bacillus, and the consequent modification of the treatment of tubercular affections, have been followed by a marked diminution in the mortality from phthisis; and, within recent years, the discovery of Röntgen rays and of radium has furnished the medical world with powerful new weapons for the diagnosis and treatment of disease.

Medical Jurisprudence, or *Forensic Medicine*, is 'the science which teaches the application of every branch of medical knowledge to the purposes of the law.' Expert medical evidence is required to establish the facts which have to be ascertained in connection with a large variety of legal questions both in criminal and in civil cases—(*e.g.*) questions as to the cause of sudden or violent death or poisoning, and questions connected with infanticide, abortion, rape, legitimacy, impotence, sterility, and every form of insanity.

MEDICINE HAT, a town of Alberta, Canada, 180 m. E.S.E. of Calgary, with wood-working factories, iron, steel, chemical, and cement works. Important strikes of natural gas have been made in the district. It is one of the greatest flour milling centers in the world. Pop. 20,000.

MEDINA.—(1) (24° 58′ N., 39° 58′ E.), small town, Hejaz, Arabia; second great holy city of Mohammedans; contains tomb of Mohammed, who took refuge here after his flight from Mecca in 622 A.D.; M. is strongly fortified and encircled by walls; principal building is mosque, which contains Prophet's tomb, and has lofty cupola and four towers; present building is result of frequent reconstruction. Pop. *c.* 18,000.

MEDINA, a village of New York, in Orleans co. It is on the New York Central and the Hudson River railroads, and on the Erie Canal and Oak Orchard creek. It is the center of an agricultural district. Its industries include the manufacture of iron, pumps and cigars. The famous Medina Falls are in the neighborhood. Pop. 1920, 6,287.

MEDINA SIDONIA (36° 27′ N., 5° 53′ W.), town, on Sequillo, Cadiz, Spain; ancestral seat of dukes of M.S. Pop. 11,000.

MEDINA SIDONIA, DON ALONSO PEREZ DE GUZMAN EL BUENO, 7TH DUKE OF (1550-1615), commander-in-chief of Spanish Armada; descendant of noble family of Guzma, richest and most powerful of Spain; incapable, and promoted by favor; app. captain-general of Lombardy, 1581; commander of Armada, 1588; responsible for Eng. success at Cadiz, 1596.

MEDIOLANUM, name of several Rom. cities; that in Cisalpine Gaul, founded by Insubres (according to Livy), was taken from that people by Romans, 222 B.C.; chief city of Western Empire when captured by Goths, 569.

MEDITERRANEAN SEA, great inland sea, with Europe on N., Asia on E., Africa on S. (35° 30′ N., 15° E.); communicating with Atlantic by Strait of Gibraltar, with Black Sea by Dardanelles, Sea of Marmora, and Bosporus, with Red Sea by Suez Canal; is practically uninfluenced by oceanic tidal wave; has great depth, three basins being revealed by soundings—(*viz.*) western basin, W. of Corsica and Sardinia, greatest depth, 10,322 ft., W. of Sardinia; Tyrrhenian depression, between Corsica and Sardinia, Sicily and Italy; eastern basin, between S. Italy and coast of Palestine, greatest depth, the Pola Deep, 14,436 ft., lying between Malta and Crète. Submerged mountains, known as the Adventure Bank, connect Sicily with Tunis.

The salinity of the Mediterranean is slightly greater than that of the Atlantic, and the deep blue color of its waters is well known. The 'Mediterranean Region' forms a distinct climatic unit, characterized by winter rains and summer drought. Local winds form an important feature in nearly all the coast climates of this area—(*e.g.*) *mistral* (Rhone Valley), *bora* (Istria and Dalmatia), *maestro*, (Adriatic), *sirocco* (Sicily and S. Italy), *leveche* and *solano* (S.E. Spain). From the Atlantic there is a constant surface current into the Mediterranean, and one from the Black Sea also. The chief islands are Balearic, Sardinia, Corsica, Sicily, Crete, Cyprus. Many species of fish inhabit the waters, and the sponge, tunny and sardine fisheries are important. Greatest length, 2,330 m.; greatest breadth, 495 m. Area, over 1,000,000 sq. m. See MAP EUROPE.

MEDIUM, term used in spiritualism for person through whom messages are believed to be conveyed from the other world.

MÉDOC (45° 9′ N., 0° 42′ W.); district, Gironde, France, stretching along Gironde; famous wines.

MEDULLA OBLONGATA. See BRAIN.

MEDUSA, see GORGONS, THE.

MEDUSA, general name for a jelly-fish, either the large floating mass belonging to the Scyphomedusæ (*q.v.*) or the small swimming-bell of the Hydromedusæ (*q.v.*).

MEDWAY (51° 27′ N.; 0° 43′ E.), river, S.E. England; joins Thames at Sheerness; length, 60 miles, of which over 40 are navigable.

MEERANE (50° 51′ N.; 12° 28′ E.), town, Saxony, Germany; woolen cloth. Pop. 30,000.

MEERSCHAUM, hydrated silicate of magnesium occurring as fine white clay in Austria, Turkey, Spain, and other places in Europe; used for making tobacco pipes.

MEERUT,—(1) (28° 55′ N.; 77° 30′ E.), district, United Provinces, India; area, 2360 sq. miles; produces cereals, cotton, sugar-cane. Pop. 1,540,175. (2) (29° N., 77° 41′ E.), town, United Provinces; trades in cotton; here Mutiny first broke out, 1857. Pop. 120,000. M. division has area 11,310 sq. miles. Pop. *c.* 6,000,000.

MEGALOPOLIS, magnificent city of ancient Greece, built by Arcadians under direction of Epaminondas, near junction of Alphæus and Helisson, 370 B.C.; idea was to collect forces against Spartan inroads as Argives had done in Argos; sacked by Spartans, 222; speedily fell into decay; now deserted ruins; famous inhabitants were Philopœmen and historian Polybius; excavations by Brit. school at Athens, 1892.

MEGALOSAURUS, a carnivorous dinosaur of huge size, belonging to the group Theropoda. Their remains are found in the oölithic rocks of Europe. They varied in length from 15 to 50 feet, and their general shape resembled that of the lizards, but their legs were proportionately longer and heavier. They were covered with scales, and their jaws were provided with sharp teeth. The remains which have been examined indicate that for so large an animal the skeleton is light. The forelegs and hindlegs differ greatly in size, the forelegs being so small that it is believed that they were little used for locomotion. The forefeet were five-toed, whereas the hind feet were three-toed, and the hind limbs were big and heavy. The animal had a long, thick tail.

MEGAPHONE, instrument invented by Edison, for facilitating the conveyance of sound for a distance of some miles. It consists of two large and tapering funnels.

MEGARA, town of ancient Greece; capital of the Megarid district; Dorian, but dependent on Athens until time of Codrus; being on route from Athens to Peloponnesus, and possessing excellent ports, became great mart and was mother of colonies in Sicily, Asia Minor, Black Sea, Sea of Marmora, etc.; nearly ruined by Delian League.

Megarian School, a Gk. school of philosophy founded in Megara, his native city, by Euclid (not the geometer) a friend of Socrates. The school seems to have asserted the unity of Being or the Good to the point of denying all reality to changeable and imperfect things.

MEGHNA, MEGNA (23° 15′ N., 90° 45′ E.), the delta estuary of Ganges and Brahmaputra, India; noted 'bore.'

MEHEMET ALI (1769-1849), viceroy of Egypt. As pasha of Egypt, M.A., an illiterate peasant of genius, and his *s.* Ibrahim played an important part in the Gk. War of Independence, 1827. Finally the Powers agreed by the Convention of London to force terms on M.A., who had assumed the title of viceroy of Egypt in 1834. France held out and aided him, but Napier forced him to return the Turk. fleet, captured by Ibrahim, and he made submission.

MEIGHEN, ARTHUR (1874), Canadian statesman; *b.* Perth, co. Ontario; studied at Toronto Univ.; called to bar, 1903; elected to House of Commons, 1908; solicitor-general, 1913; secretary of state and minister of mines, 1917; member of imperial war cabinet, 1918. In 1920 he succeeded Sir Robert Borden as prime minister, serving until 1922.

MEIKLEJOHN, ALEXANDER (1872), college president. *b.* in Rochdale, England. In 1880 he came to America. Graduated from Brown University in 1893. From 1897-99 he was instructor of philosophy, 1899-1903 assistant professor, 1903-1906 associate professor 1906-1912 professor of logic and metaphysics and from 1901-12 dean of Brown University. President of Amherst College from 1912 to 1923.

MEIKTILA (*c.* 20° 52′ N., 96° 10′ E.), district and division of Upper Burma. District (2178 sq. miles) consists of an undulating plain; chief occupation, cattle breeding and agriculture. Pop. 250,000. Division includes districts of Meiktila, Kyaukse, Yamethin, and Myingyan; area, 10,854 sq. miles. Pop. 1,000,000; town, 6,000.

MEININGEN (50° 34′ N., 10° 25′ E.), capital, Saxe-Meiningen, Germany, on Werra; contains theatre and ducal palace, with collections. Pop. 20,000.

MEISSEN (51° 10′ N., 13° 28′ E.), town, Saxony, Germany; famous for Dresden china; has beautiful Gothic cathedral dating from XI. cent. Pop. 35,000.

MEISSEN (51° 10′ N., 13° 28′ E.), district, Saxony; gave name to margraviate in X. cent.; in 1423 the Margrave, Frederick the Warlike, who succ. his uncle, 1407, was cr. elector of Saxe-Wittenberg; and henceforth M. was included in duchy, afterwards kingdom of Saxony.

MEISSONIER, JEAN LOUIS ERNEST (1815-91), Fr. painter; first distinguished himself as book-illustrator, later for his elaborate genre pictures, including several celebrated military scenes; executed some striking portraits. His most notable pictures are 1807 representing Napoleon at Friedland; '1805' and *Jena*. Many of his pictures are known by engravings.

MEISTERSINGERS. See MINNESINGERS.

MEKONG (9° 55′ N., 106° 38′ E.), river, Indo-China; rises in Tibet, separates Annam from Siam; enters China Sea; length, over 2700 miles; basin, 400,000 sq. miles.

MEKRAN, MAKRAN (26° N., 61° E.), district in S.W. Baluchistan and S.E. Persia, bordering Arabian Sea; corresponds to ancient *Gedrosia*; is an arid and barren plateau region; divided into petty districts under separate chiefs.

MELA, POMPONIUS (*fl. c.* A.D. 43), earliest Rom. geographer; a native of Spain. His geography, called *De Situ Orbis*, is in three parts.

MELANCHTHON, PHILIPP (1497-1560), Ger. Reformer; original name, Schwarzerd; ed. at Heidelberg and Tübingen; prof. of Greek at Wittenberg, 1518. In 1519 he began to play his part in the Reformation struggles at the Leipzig disputation. When Luther was in the Wartburg M. led the Protestants in Wittenberg. He disputed with Zwingli at Marburg, 1529, over the Eucharist. He was one of the more moderate of the Reformers, and as such had intercourse with Catholics when compromise was attempted. He tried to shelve difficulties by using vague language; his theology was really Lutheran. He wrote *Loci Communes Rerum Theologicarum* and other works.

MELANESIA (10° S., 155° E.), collective name for island groups in Pacific, comprising Bismarck, Solomon, Santa Cruz, New Hebrides, New Caledonia, Loyalty, and other archipelagoes.

MELBA, MADAME NELLIE (Helen Porter Armstrong) (1865), Australian singer and prima donna; first appeared in London in 1886, and in the course of the next few years firmly established her position as one of the great singers of the world. Her first great success at Covent Garden was in *Lucia di Lammermoor*, and she also scored a great triumph in *Romeo and Juliet*.

MELBOURNE, Cap. Victoria, Australia (37° 50′ S., 144° 58′ E.), temporary seat of Commonwealth government; contains Houses of Parliament, Government House, Anglican and R.C. cathedrals, observatory, mint, various museums, libraries, and charitable establishments; seat of univ. (founded 1855); has fine parks and public gardens; great gold, wool, and farm-produce center; has fine harbor; plans have been adopted for construction of four new docks to ease handling of refrigerated produce and provide ample berthing for ocean-going steamers; exports frozen meat, wool, dairy produce, fruit, wine, grain; founded in 1835; episc. see, 1847; made cap. of Victoria, 1851; suffered from financial depression 1892-3; pop. 723,500.

MELBOURNE, WILLIAM LAMB, 2ND VISCOUNT (1779-1848), Brit. statesman; Prime Minister, 1834 and 1835-41; polished dilettante; trained young queen, Victoria, as constitutional ruler.

MELCHIADES, pope, 310-14.

MELCHITES, Christian sect, founded V. cent.; with Eastern rites, but under authority of R.C. Church; consist of 90,000 Syrians and Egyptians.

MELCHIZEDEK, in *Genesis* 14, priest-king of Salem, who blesses Abraham, and is taken as the type of Jesus Christ in the *Epistle to the Hebrews*.

MELEAGER (classical myth.), king of Calydon; slew wild boar sent by Artemis, and gave skin to Atalanta.

MELETIUS, bp. of Lycopolis; his followers formed *Meletian sect*.

MELETIUS OF ANTIOCH (*d.* 381), bp. of Antioch, 360; obliged to go into exile owing to Christological disputes, but returned later. M. at first held to the *Homoean* view, but gradually became orthodox.

MELFI (41° N., 15° 38′ E.), town, Potenza, Italy; was Norman capital of Apulia, XI. cent.; fruit, grain. Pop. *c.* 15,000.

MELILLA (35° 16′ N., 2° 58′ W.), fortified seaport and Span. penal settlement, Morocco. Pop. 10,000.

MELINITE.—1. A yellow clayey material, looking like yellow ochre. It has a sp. gr. of 2·24, is lamellar in structure, shining in streak, and is found at Amberg, in Bavaria. 2. An explosive used as a bursting charge for shells. The process of manufacture is not public property, but it is in all probability a derivative of picric acid.

MELLON, ANDREW WILLIAM (1852), American financier and cabinet officer; *b.* Pittsburgh, Pa. He was educated at the University of Pittsburgh, and early became associated with Henry C. Frick in large coal, coke and iron enterprises. He has been an official and director in many great financial institutions and corporate undertakings. His fortune is estimated as close to $100,000,000. The town of Danora, Pa. with its great steel mills was founded by him. In 1921 he became secretary of the Treasury in the cabinet of President Harding. His conduct of the office was marked by conservatism and ability. One of the notable events of his administration was the arrangement for the settlement of the British war debt to the United States in 1923.

MELLON INSTITUTE OF INDUSTRIAL RESEARCH. Founded by Andrew W. Mellon and Richard B. Mellon, brothers, February 26, 1915. It developed from a department of the University of Pittsburgh in charge of the originator Dr. R. K. Kennedy. The institute takes over industrial problems from individuals, companies, and associations of established integrity under a fixed agreement, who may become donors of Industrial Fellowships for a definite sum of money for not less than a year. This is used to pay salaries and research experiments. Industrial Fellowships are Individual and Multiple. With the first there is one research man (with assistants when necessary) who reports to the administration. In 1922 there were 34 Individual and 14 Multiple Fellowships.

MELODRAMA, originally a musical drama, or a drama interspersed with vocal or instrumental music. Now it is generally a non-operatic play of a semi-tragic or serious character, wherein surprises, acts of violence, dancing, music, and comic occurrences are all mixed together, to excite and sustain the attention of the audience. The two earliest plays of this type in the English language are *A Tale of Mystery*, 1802; and *Deaf and Dumb*, 1801, by Thos. Holcroft.

MELODY, in music, may be defined as a well-ordered and pleasing succession of sounds intended for voice or instrument; less strictly, the air, or tune, or leading theme in a composition.

MELON (*Cucumis melo*), member of the Cucuroitaceæ; climbs by means of leaf tendrils. Fruit is very large for the size of the plant. There are many varieties classed under cantaloupe, water melon and muskmelon.

MELORIA (*c.* 43° 35′ N., 10° 15′ E.), island, off Leghorn, Italy; here Genoese were defeated by Frederick II., 1241; Genoese defeated Pisans, 1284.

MELOS, MILO (36° 42′ N.; 24° 25′ E.), one of Cyclades Islands, Ægean Sea; settled by Dorians at an early date; taken by Athenians, 416 B.C. Here the Venus of Milo (now in Louvre) was found in 1820. Pop. 6000.

MELPOMENE, in Greek mythology, the muse of tragedy. She is generally represented fully draped, with a calm expression, holding a bearded, open-mouthed mask.

MELROSE (55° 37′ N., 2° 44′ W.), small town, Roxburghshire, Scotland.

MELROSE PARK, a city of Illinois. Pop. 1920, 7147.

MELROSE, a city of Massachusetts, in Middlesex co. It is on the Boston and Maine Railroad. It includes several villages. The city really forms a suburb of Boston. Its industries include the manufacture of boots and shoes, and rubber goods. Pop. 1920, 18,204.

MELTING POINT. The temperature at which a substance changes from the solid to the liquid state. The determination of this point is frequently made for scientific purposes. In analytical chemistry the determination of the melting point of an organic compound furnishes a clue to its identity, and is also a criterion of purity, as the presence of foreign compounds will affect the temperature at which it melts. In metallurgy, the determination of the melting points of alloys is frequently of importance, and affords information regarding the composition of the alloy and the character of the reactions occurring when the metals are melted together.

MELUN (48° 32′ N.; 2° 39′ E.), chief town, Seine-et-Marne, France; ancient *Melodunum*; taken by Labienus, 52 B.C.; agricultural implements; active trade. Pop. 14,000.

MELVILLE—1. An island off the coast of North Australia, separated by Clarence Strait from the mainland. It is 70 m. long and 30 m. broad, and was discovered by King. 2. The largest

of the Parry Is. in the N. Polar Sea, Arctic America, separated (W.) by Fitzwilliam Strait from Prince Patrick Is., by Melville Sound (S. and S.E.) from Victoria Land and Prince of Wales' Land. It was discovered and named by Parry (1819-20). Length 200 m., breadth 130 m. 3. A peninsula in N. Canada, bounded W. by Boothia Gulf, N. by Fury and Hecla Strait (separating it from Baffin Land), E. by Fox Channel. Length 250 m., average breadth 100 m. 4. A sound, 250 m. long by 200 m. broad, communicating with the Arctic Ocean and Baffin Bay, S.E. of Melville Is.

MELVILLE, ANDREW (1545-1622), Scot. scholar and theologian; *b.* near Montrose; was reckoned finest scholar of his day; champion of Scot. Presbyterianism, his vehemence and zeal roused the hatred of James VI. and I., who had him imprisoned in the Tower of London for four years.

MELVILLE, GEORGE WALLACE (1841-1912), an American naval officer; *b.* in New York City. Graduating from the Brooklyn Polytechnical Institute, he entered the Navy as an engineer, in 1861. In 1879 he joined the famous Jeanette expedition which sailed under the command of Lieutenant De Long from San Francisco to discover a Northeast passage around the North American Continent, by way of Behring Sea. After the ship had been crushed in the ice Melville was in command of one of the boats and led his party to safety through the wilds of Siberia. He also led the expedition which recovered the records of the Jeannette and the body of De Long. In 1887 he ws made Chief Engineer of the U.S. Navy. He was promoted to the rank of rear-admiral in 1889 and retired in 1903. He wrote *In The Lena Delta*, his narrative of the Jeannette disaster, which was published in 1885.

MELVILLE, HERMAN (1819-1891), an American writer; *b.* in New York. As a boy he made a trip to Liverpool as a cabin boy, taught school for a while and in 1841 shipped in a whaler for the South Pacific. During the voyage the treatment by the captain had been so severe that Melville and one of his shipmates deserted on one of the Marquesas, in the South Pacific, whence they were rescued some months later by an Australian whaler. His experiences among the natives of the island formed the material of his first book, *Typee, A Peep of Polynesian Life*, published in 1846, which immediately gained him wide recognition. His other books were equally popular. Among them are *Omoo, Adventures in the South Seas*, 1847; *White Jacket, or the World in a Man-of-War*, 1850; *Moby Dick, or the White Whale*, 1851, republished in 1922; *Pierre, or the Ambiguities*, 1852; and *Battle Pieces, and Aspects of the War*, (verse, 1866).

MELVILLE, JAMES (1556 - 1614), Scot. reformer; one of leaders of Presbyterian party against James VI.; letters and diary important hist. source, and of literary value.

MEMEL. (1) Seaport, on Kurisches Haff (55° 42′ N., 21° 10′ E.), in the League of Nations' territory (formerly German) between E. Prussia and Lithuania; center of Baltic timber trade; iron foundries, shipbuilding yards, herring fishing. During World War was captured and evacuated by the Russians (March 1915); a general commissioner for the territory was appointed (Feb. 1920) and the protection of foreign subjects entrusted to France. Pop. 31,500. (2) Or Niemen, riv., forming boundary between League of Nations' territory and E. Prussia, and between Lithuania and Poland; rises in Minsk region (55° 4′ N., 22° 15′ E.); falls by several mouths into Kurisches Haff; length, 500 m.

MEMLING, HANS (*c.* 1430 - 94); Flemish painter; pictures, including fourteen adoring the shrine of St. Ursula at Cologne, are mostly religious, with a few portraits.

MEMMINGEN (47° 58′ N.; 10° 11′ E.), town, Swabia, Bavaria; manufactures iron, leather, textiles. Pop. 13,000.

MEMNON (classical myth.), *s.* of Eōs (Dawn) and Tithonus; slain by Achilles at siege of Troy. Name M. was given to one of the two colossal statues of Amenoph III. at Thebes; it emitted a musical sound at dawn and was one of the Seven Wonders.

MEMORIAL DAY. See DECORATION DAY.

MEMPHIS.—1. A famous ancient city of Lower Egypt on the Nile, its ruins standing 12 m. S. of Cairo. It was said to have been built by Menes, the first historical King of Egypt, and became the first capital of the entire kingdom of Egypt. It grew to great importance under Pepy or Apopi I. (*c.* 1700 B.C.), who built the pyramid 'Men-nofer' near by. Among its numerous ancient buildings were temples of Ptah or Hephæstos, of Isis (6th century B.C.), of Serapis, and of Ra. The pyramids and statues of Rameses II. remain, and the ruins of Sakkara close by. The Noph of the O.T. (Is. xix. 13; Jer. ii. 16) is probably M. The city

declined rapidly after the Arab conquest. The modern village of Mit-Rapinêh (Mitranieh) in Gize province marks the site.

MEMPHIS, a city of Tennessee, in Shelby co., of which it is the county seat. It is on several important railroads and on the Mississippi River. Memphis is an important industrial city and is one of the largest trade centers for cotton in the United States. It has also large manufacturing interests including cottonseed oil mills, flour mills, grist mills, planing mills, foundry and machine shops, carriage and wagon factories, etc. The city is well laid out and has many handsome public buildings. It is the seat of Christian Brothers College, St. Mary's School, Memphis Institute, Higbee School, Le Moine School and Hannibal Medical College. The public buildings include a custom house, cotton exchange, merchant's exchange, and a public library. The river here is spanned by an immense railroad bridge built at a cost of over three million dollars. In the public school system are about 25,000 pupils. Memphis is one of the most important industrial cities of the South and at the time of important commerce on the Mississippi was the chief port for river trade. A naval battle was fought here in 1862 between Federal and Confederate squadrons. This resulted in a victory for the Union vessels and the city was occupied by Northern vessels until the close of the war. Pop. 1920, 162,351.

MENAM (15° N., 100° 30′ E.), river, Siam; flows by several mouths into Gulf of Siam.

MENANDER (II. cent. B.C.), Gk. king of Bactria; said to have been greater conqueror than Alexander the Great; Strabo preserves statement that he conquered India as far as mouth of Indus; coins remain, and he appears as 'Milinda' in Indian legend.

MENANDER (342-291 B.C.), Gk. dramatist of the new comedy; important fragments of his comedies have recently been discovered; excelled in delineation of intrigue and in subtle character-drawing. His style and plots were closely imitated by Terence (*q.v.*).

MENASHA, a city of Wisconsin, in Winnebago co. It is on the Chicago and Northwestern and other railroads and on Lake Winnebago. It is a popular summer resort and has also extensive industries, including woolen mills, foundries, paper mills and cigar factories. Pop. 1920, 7,214.

MENCIUS, MANG-TSE (c. 372-289 B.C.), Chin. philosopher; ed. carefully by his mother, who has been made the ideal of motherhood among the Chinese; like his pattern, Confucius, he founded a school of thought; endeavored, when well advanced in years, to find a prince who would put into execution his social and political ideals. His sayings were collected by his disciples into the *Book of Mang-tse*, upon which modern Chin. ethics are largely founded.

MENDELÉEFF, DMITRI IVANOVITSCH (1834-1907), Russ. chemist; worked on solutions and petroleum; chief founder of periodic law (See ELEMENT); author of *Principles of Chemistry*.

MENDELISM, a branch of the study of Heredity, concerned with the facts and theories centered upon the discoveries made by Gregor Mendel from his experiments in plant hybridization, and announced in 1865.

MENDELSSOHN, MOSES (1729-86), Jewish philosopher; *b.* Dessau; *s.* of Jewish schoolmaster; head of mercantile house, but principally occupied in philosophical pursuits; labored for emancipation of Jews, and sought to remedy their neglect of secular studies; first known to public through Lessing; argued for immortality of the soul.

MENDELSSOHN - BARTHOLDY, FELIX (1809-47), Ger. composer; *b.* Hamburg; came of wealthy Jewish family, which finally adopted Christianity, his grandfather being the famous Moses M., the philosopher and historian; before he was ten M. played in public, and at twelve was already a composer; professional training, completed at Berlin and Paris, was supplemented by a liberal general education, and rounded off by extensive tours on Continent and in England, a visit to Scotland resulting in the *Scotch Symphony* and the *Hebrides Overture*, while Italy produced the *Italian Symphony*. Before this, at age of seventeen, he had written his great orchestral work, the *Midsummer Night's Dream* overture. Settling in Leipzig, he directed the famous Gewandhaus concerts there and founded the Conservatoire. His activity was incessant, and directly led to his early death. His works range over almost the entire field of musical form, from song to symphony and oratorio. His genius is best exhibited in his symphonies and two oratorios, *St. Paul* and *Elijah*.

MENDÉS, CATULLE (1841-1909), Fr. poet, novelist, dramatic and musical critic; started Parnassian movement; wrote poetry, novels, plays, but greater as critic than stylist; much of his vogue *succes de scandale*.

MENDICANT FRIARS, non-cloistral religious orders formed in XIII. cent.; chief—Franciscans, Dominicans, Claresses, Tertiaries, Carmelites, Austin, Servites; 2nd Council of Lyons, 1274, recognized four orders, Franciscans, Dominicans, Carmelites, and Austin friars, and forbade further orders; root idea absence of property; hence, when engaged in preaching, etc., necessity for mendicancy.

MENDIP HILLS (51° 18′ N., 2° 42′ W.), range of hills, Somersetshire, England; highest point, Blackdown (1067 ft.).

MENDOZA.—(1) (*c.* 33° 20′ S., 68° 20′ W.), province, Argentina, S. America; area, 56,502 sq. miles; mountainous in W.; drained by M. and other rivers; coal, petroleum; cereals, tobacco, wine. Pop. 1910, 225,246. (2) (32° 52′ S., 68° 48′ W.), town, Argentina, S. America; ruined by earthquake, 1861, since rebuilt; produces wine, fruit. Pop. 45,000.

MENDOZA, DIEGO HURTADO DE (1503-75), Span. novelist and statesman; represented Charles X. at the Council of Trent, and wrote *The War of Granada* dealing with the revolt of the Moriscoes against the tyranny of Philip II.

MENDOZA, PEDRO GONZALEZ DE (1428-95), Span. cardinal and statesman; fought for Henry IV.; helped to establish Isabella on throne and capture Granada from Moors; made abp. of Toledo, 1492.

MENELAUS, in Greek mythology, was the *s.* of Atreus and younger *bro.* of Agamemnon. He was King of Lacedæmon and husband of Helen, of whom Paris robbed him, together with his treasures. He organized an expedition for her recovery, and with Agamemnon was one of the heroes of the wooden horse. He spent the rest of his life quietly with Helen, by whom he was the *f.* of Hermione and Megapenthes, the former of whom married Neoptolemus, *s.* of Achilles.

MENELIK II. (1844-1921), emperor of Abyssinia; succ. 1889; owing to illness, duties entrusted to regent, 1909; gave French and British trading facilities and aided British in Sudan War.

MENGTSZE (23° 24′ N., 103° 20′ E.), city, treaty-port, Yunnan, China. Pop. 20,000.

MENHADEN. See under HERRING FAMILY.

MENIÈRE'S DISEASE, an affection characterized by sudden dizziness, noises in the ear, deafness in one or both ears, intense nausea and vomiting—and the individual may stagger and fall down unconscious. The symptoms arise from disturbance of the internal ear caused by hemorrhage or inflammation, due for example, to intense heat, rheumatism, influenza, syphilis, anæmia.

MENIN, or **MEENEN,** tn., W. Flanders, Belgium (50° 47′ N., 3° 6′ E.), on Lys; textiles, rubber goods, soap; flax and tobacco cultivated in neighborhood. In the early months of the World War it was an important pivotal position during the race to the sea. Lost in the first battle of Ypres, it and the vicinity witnessed some of the fiercest fighting in the whole war. It was captured during the final offensive (Oct. 16, 1918). Pop. 21,000.

MENINGITIS, inflammation of the membranes enveloping the brain (cerebral m.) or the spinal cord (spinal m.), or both. *Simple acute m.* is caused by injury, by extension of inflammation from neighboring parts, (*e.g.*) middle ear, or as a complication of various fevers, the upper surface of the brain being the usual site of the inflammation. The symptoms are at first headache and restlessness, then fever, irritation, and convulsions, with retraction of the head, the patient lying in a distinctive position, and then stupor and paralysis ensue, accompanied by the characteristic cry and difficulty in breathing, and death may soon take place.

Tubercular m. is usually part of a general tuberculosis, the site of the inflammation generally being the base of the brain, and the symptoms resemble those of simple acute m. the head, however, being usually more retracted and the neck more rigid. *Epidemic cerebro-spinal m.* is an acute infectious disease due to a bacterium, the *diplococcus intracellularis,* an attack coming on suddenly, with nervous shock, extreme pain at the back of the head and neck, dizziness, rise of temperature, delirium, and perhaps coma, the head being strongly retracted and the limbs and body rigid, and there may be paralysis of one or other of the limbs.

Spinal m. may be acute or chronic, the symptoms in the former being pain in the back, cutaneous pains, then anæsthesia and paralysis, first of the legs.

MENIUS, JUSTUS (1499 - 1558), Lutheran divine; at first humanist, then disciple of Luther; wrote various works, one against the bigamy of Philip of Hesse.

MENNO SIMONS (1492 - 1559), Dutch theologian and founder of sect bearing his name. Influenced by

Luther, M. left R.C. Church, 1536. His theology was mostly orthodox, rather puritan in tone. He went from place to place in Holland preaching.

MENNONITES, religious sect called after Menno. They were anti-sacerdotalist, and persecuted by Catholics and Protestants alike, as they disapproved of civil authority although willing to submit to it. They now exist in the United States, on the Continent of Europe, and in Canada.

MENOMINEE, a city of Michigan, in Menominee co., of which it is the county seat. It is on the Chicago, Milwaukee and St. Paul, the Chicago and Northwestern, and the Wisconsin and Michigan railroads, and on Green Bay, at the mouth of the Menominee River. It is an important industrial city and was at once time one of the largest shipping ports in the world. The public buildings include a high school, public library, and a hospital. It is the seat of Menominee County Agricultural College. Its industries include the manufacture of shoes, paper and steel. Pop. 1920, 8,907.

MENOMINIE, a city of Wisconsin, in Dunn co., of which it is the county seat. It is on the Chicago, St. Paul,-Minneapolis and Omaha, and the Chicago, Milwaukee and St. Paul railroads, and on Red Cedar River. The industries include the manufacture of lumber, brick, flour, gasoline, engines, cigars, etc. It is the seat of the Stout Manual Training School and the County Asylum for Chronic Cases. It has a public library. Pop. 1920, 5,104.

MENSHIKOV, ALEXANDER DANILOVITCH (1673 or '72?-1729), a Russian statesman and field-marshal; *b.* at Moscow. He began life by selling meatpies in the streets of Moscow, and had Lefort to thank for his introduction to Peter the Great, with whom he had thoroughly ingratiated himself by 1699. As a soldier he distinguished himself at the siege of Azov (1696), and the battles of Kalisch and Poltava (1790), and again in the occupation of Courland and Pomerania and the seizure of Riga and Stettin. As a civil administrator he executed Peter's reforms with remarkable promptitude and success, and on his death (1725) assumed the reins of government during the brief rule of Catherine and the minority of Peter II. Ousted from power by the Dolgorukis, he was banished and died an exile in Siberia.

MENSHIKOV, ALEXANDER SERGEIEVICH (1789 - 1869) a Russian general and admiral, was the great-grandson of Alexander Danilovitch M. He served Alexander in the Napoleonic campaigns of 1812-15, and in 1828 captured Anapa from the Turks. Created admiral in 1834, he improved very considerably the standard of efficiency in the navy. During the Crimean War (1854-56) he commanded the Russian forces at Alma, Inkermann, and round Sebastopol.

MENSURATION deals with the measurement of lengths, areas, and volumes by establishing and applying certain rules and formulæ. It is based on geometry and trigonometry. In the case of curves which can be expressed by equations, the formulæ are best obtained by the calculus. Mechanical methods have been devised for the calculation of irregular lengths and areas.

MENTAL HEALING. See CHRISTIAN SCIENCE; AUTO-SUGGESTION.

MENTAL HYGIENE, the science of creating favorable conditions for mental health. The follower of the science tends to look upon moral delinquency as having its origin in mental ill-health. By investigating the cause of this ill-health he is led to ascribe it to an inability so to harness fundamental instincts as to express them in activities which are socially beneficial. He seeks to make a profound study of the development of the human mind from infancy to adulthood, and in much of the failure and wrongdoing of adults he sees the result of arrested psychological development. Irritability, dishonesty, lying, selfishness, prudery, and other traits are considered as displays of childishness, and a cure is sought by discovering the factors which have prevented the individual from developing, and then helping him to find an outlet for his energies in creative and useful enterprises. As a logical consequence of this line of thought, much attention is given to the growth of the child mind, with a view to preventing the occurrence of arrested development. Every effort is made to overcome the old idea that the child is the property of its parents and exists to do the will of its parents for their benefit. On the contrary, the doctrine is taught that the parents exist for the benefit of the child, and that the interests of the child are paramount. It is urged, however, that the child must be taught to be self-reliant, and the belief must not be fostered in him that the parents exist for his pleasure. Much importance is attached to the fostering of a healthy relationship between parents and children, guarding on the one hand against repression of healthy instincts

for the sake of the parents' comfort, and on the other against an indulgence which will lead to a dependence, on the parents, persisting into adult life.

MENTAL PHILOSOPHY. See PSYCHOLOGY.

MENTAWEI (2° S., 98° E.), group of islands, off W. coast of Sumatra.

MENTHOL, camphor made from oil of peppermint; chief source is *Mentha arvensis*; m. cones produce coldness by evaporation when rubbed on skin, hence use for neuralgia, etc.

MENTONE (43° 49′ N., 7° 29′ E.), town, France, on Mediterranean; sold to France by Prince of Monaco, 1861; favorite winter resort; produces oranges, lemons, olive oil. Pop. 12,500.

MENTOR figures in Greek legend, and especially in Homer, as the *s.* of Alcimus, the trusted friend of Odysseus and the wise preceptor of Odysseus' *s.*, Telemachus. It was he who had charge of Odysseus' home in Ithaca while the latter was abroad. His name has become synonymous with 'trustworthy counsellor.'

MENZEL, ADOLPH FRIEDRICH ERMANN VON (1815-1905), Ger. artist; illustrated *History of Frederick the Great*; brought Realism into Germany.

MEPHISTOPHELES (Gk. 'he who loves not light') is name given to incarnation of evil. In *Faust* M. is not Satan himself, but his chief minister.

MEQUINEZ, MEKINEZ (33° 55′ N., 5° 30′ W.), city, Morocco, N. Africa; one of the royal residences; royal burying-place. Pop. 25,000.

MERAN (46° 41′ N.; 11° 8′ E.), health-resort, Tyrol, Austria. Pop. 12,000.

MERCATOR, GERARDUS (1512-94), Flemish mathematician; original name, Kremer; studied at Louvain; became lecturer on geography and astronomy; entered service of Charles V. of France; cosmographer to Duke of Juliers, 1559; author of method of projection known by his name in which meridians and lines of latitude are straight and cut at right angles.

MERCERIZING, method of treating cotton so as to give silky appearance; cotton is steeped in solution of caustic soda, and at the same time stretched; soda shrinks material, stretching gives wrinkled silky appearance; discovered by Mercer, and patented, 1850.

MERCIA, central kingdom or division of England in olden times, so-called because it lay between the remaining Saxon lands and Celtic Wales. Mercians are first mentioned in early VII. cent., when they had already a king. Penda, 626-55, established Mercian supremacy, which, after lapses, was restored by Wulfhere, 659-75; Ethelbald, 716-57, and the great Offa, 757-96; culmination under Offa, called *rex Anglorum* by Pope Hadrian I. M. came under Dan. overlordship, 874. Last independent ruler was Ethelfled, 'lady of the Mercians,' who died 918.

MERCIER, CHARLES ARTHUR (1852-1919), Brit. physician and criminologist. In addition to the distinction he attained in psychiatric medicine, he was an expert in criminology, and received the Swiney prize for his *Criminal Responsibility*, 1908, and again for *Crime and Criminals*, 1918. Other works include *Sanity and Insanity*, *Nervous System and the Mind*, *Lunacy Law for Medical Men*, and a *Text-book of Insanity*.

MERCIER, DESIRÉ (1852), Belgian ecclesiastic; has been Archbishop of Malines and cardinal since 1907; is the founder of the *Revue Neo-scholastique*. During the World War he was uncompromising in his opposition to the Ger. invaders, and one of his pastoral letters —an eloquent exposition of the civic and national rights of Belgium—resulted in his being placed under arrest in Jan. 1915. His *War Memories* appeared in the *Times*, Dec. 1919, and he has also pub. *Criteriologie Metaphysique Generale*, *Les Origines de la Psychologie Contemporaine*, and a *Manual of Modern Socialistic Philosophy*. He visited the United States in 1922.

MERCIER, HONORÉ (1840-94), Fr.-Canadian statesman; editor of *Courier de St. Hyacinthe*; Solicitor-General in Quebec, 1879; leader of Liberal opposition, 1883; Prime Minister and Attorney-General, 1887-91.

MERCURIUS, or **MERCURY,** was the Roman god of commerce, his name being derived from *merx*, merchandise. A temple near the circus Maximus was dedicated to him, and his festival was celebrated on May 15 by the *mercuriales*, who were members of a college regulating the corn trade. Mercury was identified with the Greek Hermes as early as 495 B.C.

MERCURY, smallest planet; nearest to sun—mean distance being about 36 million miles; completes a revolution of its orbit in 88 days, and is about 3000 miles in diameter. Professor Newcomb places its mass at $^1/_{15}$th that of earth, and density the same as earth's. M. is

difficult to see with naked eye owing to proximity to sun.

MERCURY, QUICKSILVER ($Hg = 200{\cdot}6$), liquid metal, occurs native and as *cinnabar*, HgS, at Idria, Austria; Almaden, Spain; California, etc.; obtained by roasting ore ($HgS + O_2 = Hg + SO_2$) and condensing vapor; silvery white, forming spherical globules; 'tails' when impure; purified by dilute nitric acid or distillation; S.G. 13·59, M.P. -38·8°, B.P. 357·2°; slowly vaporizes at atmospheric temperature, vapor monatomic; very slowly oxidized to HgO by heating in air; used for thermometers, barometers, etc., for collecting soluble gases, for mirrors and amalgams, and in electrolytic production of caustic soda; forms two series of compounds: mercurous and mercuric; probably divalent in each.

Mercurous oxide, Hg_2O, black powder.

Mercurous chloride, Hg_2Cl_2, *calomel*, prepared by sublimation: $HgCl_2 + Hg = Hg_2Cl_2$, white, tasteless, insoluble in water; dissociates when vaporized ($Hg_2Cl_2 = Hg + HgCl_2$) unless absolutely dry; used in med.

Mercurous nitrate, $Hg_2(NO_3)_2 + 2H_2O$, from cold, dilute nitric acid and mercury.

Mercuric oxide, HgO ($Hg = O$), 'mercurius calcinatus,' red precipitate; brick-red scales by ignition of nitrate, yellow by precipitation; decomposed by heat: $2HgO = 2Hg + O_2$.

Mercuric chloride, $HgCl_2$, *corrosive sublimate*; from common salt and mercuric sulphate ($HgSO_4 + 2NaCl = HgCl_2 + Na_2SO_4$).

'White precipitate,' from mercuric chloride and ammonia, is $NHgH_2Cl$.

Mercuric iodide, HgI_2, scarlet precipitate.

Mercuric sulphide, HgS, cinnabar, vermilion; black when precipitated.

Mercuric sulphate, $HgSO_4$, white powder.

MERCY, FRANZ, FREIHERR VON (*d.* 1645), Ger. general in Thirty Years War; defeated French at *Tuttlingen* and made general field-marshal, 1643; defeated at *Freiburg*, 1644; great victory of *Marienthal*, 1645; slain at *Nordlingen*, 1645. Nephew, Claudius Florimond, Count Mercy de Villets, 1666-1734, distinguished field-marshal.

MERCY, SISTERS OF. See SISTERHOODS.

MEREDITH, EDWIN, THOMAS (1876), publisher and former U.S. Secretary of Agriculture; *b.* Avoca, Iowa. He published the *Farmer's Tribune* from 1896 to 1902 and in that year established *Successful Farming*. He was a candidate for U.S. Senator as a Democrat in 1914, and for governor in 1916. President Wilson appointed him Secretary of Agriculture in January, 1920, and he held this Cabinet post till the Wilson administration went out of office in March, 1921.

MEREDITH, GEORGE (1828-1909), Eng. novelist and poet; *b.* Hampshire; pub. *Poems*, 1851, and *The Shaving of Shagpat*, 1855. The first of his great novels, *The Ordeal of Richard Feverel*, appeared 1859; then followed *Evan Harrington*, 1861; *Adventures of Harry Richmond*, 1871; *Beauchamp's Career*, 1875; *The Egoist*, 1879; *Diana of the Crossways*, 1885; *One of our Conquerors*, 1891; *The Amazing Marriage*, 1895. The poetry of his later period includes: *Modern Love*, 1862; *Poems and Lyrics of the Joy of Earth*, 1883; *Ballads and Poems of Tragic Life*, 1887; *Jump to Glory Jane*, 1892; *Selected Poems*, 1900; *a Reading of Life*, 1901, and *Short Stories*, 1902.

MEREDITH, OWEN, *nom de plume* of 1st Earl Lytton (*q.v.*).

MERGENTHALER, OTTMAR (1854-99), inventor; *b.* Wurttemberg, Germany; *d.* Baltimore, Md. He was apprenticed to a watchmaker and to escape military service emigrated in 1872 to America, where he settled in Baltimore as a technician in the production of electrical instruments. He devoted most of his career to devising appliances for superseding setting type by hand and in 1876 began to develop the Linotype (*q.v.*), which became one of the most successful inventions of the time. The Franklin Institute of Philadelphia awarded him its Elliott Cresson gold medal.

MERGUI.—(1) (12° 29′ N., 98° 31′ E.), town, Tenasserim, S. Burma; pearl trade. Pop. 14,000. (2) district, has area of 9790 sq. miles; forested; produces rice, tin. Pop. 95,000.

MERGUI ARCHIPELAGO (12° 26′ N., 98° 35′ E.), group of islands, in Bay of Bengal, Lower Burma. Pop. 12,000.

MERIDA.—(1) (20° 50′ N., 89° 35′ W.), city, capital of state Yucatan, Mexico; cathedral; several educational institutions; exports sisal fibre; manufactures straw hats, hammocks, cigars. Pop. 62,000. (2) (38° 52′ N., 6° 22′ W.), town, Spain; chiefly famous for fine Rom. remains, which include large bridge, triumphal arch, theatre, and temple. Pop. 12,000.

MERIDEN, a city of Connecticut, in New Haven co. It is on the New York New Haven and Hartford Railroad. The city is of great industrial importance. Its manufactures include the making of

tinware, cutlery, brassware, electric plated ware, graniteware, agate ware, organs, brass and iron goods, steel goods, clocks, firearms, etc. There are several important institutions including Connecticut School for Boys, Curtis School for orphan children and aged women, a high school and a library. Pop. 1920, 29,867.

MERIDIAN (from Lat. *meridies*, noon), both a terrestrial and a celestial great circle. The terrestrial M. of any given place is the line running through that place and through both the N. and S. poles. Each terrestrial has a corresponding celestial M., which passes through the N. and S. celestial poles, and also through the zenith and nadir of any place on that terrestrial M. When the sun passes the M. of Greenwich, it is not only noon at Greenwich, but also at all places situated on the same half of that M.

MERIDIAN, a city of Mississippi, in Lauderdale co., of which it is the county seat. It is on the Queen and Crescent Route and the Southern and Mobile and Ohio railroads. It is the center of an important lumbering region and it has machine shops, cotton mills and other industries. It is the seat of the Meridian Male College, Lincoln School, Meridian Female College and Meridian Academy. The city was destroyed by General Sherman in 1864. Pop. 1920, 23,399.

MÉRIMÉE, PROSPER (1803-70), Fr. novelist; chief productions short stories, full of imagination, wit, and art, which place his works among chief masterpieces of his cent. Among his chief novels are *Colomba*, 1840; *Carmen*, 1847; *Chronique du Regne de Charles* IX., 1829; *Matteo Falcone*, 1829; chief Romantic effect that of horror, exemplified in *Lokis*; as Inspector of Historical Monuments of France pub. *Voyages Archeologiques*; posthumous *Lettres a une Inconnue.*

MERINO, breed of sheep originally introduced from Africa into Spain; now found in Australasia, Cape of Good Hope, etc.; has short wool; ewes usually hornless; frequently cross-bred with other varieties.

MERIONETH (*c.* 52° 50′ N.; 3° 50′ W.), coast county, N. Wales; area, *c.* 668 sq. miles; surface rugged, reaching heights of over 2900 ft.; among highest peaks is Cader Idris; drained by Dee, Dovey, and other streams; capital, Dolgelly. M. has an excellent breed of ponies; sheep reared; has slate and limestone quarries, manganese ore; manufactures woolens

MERIVALE, CHARLES (1808-93), Eng. historian; Dean of Ely, 1869; pub. *History of Romans under the Empire*, 1850-62; valued for its style; little contribution to research; member of Apostles Club.

MERLIN, bard of Welsh legend; was a son of the devil and an unwilling human mother, and was intended by the infernal powers to be the great Antichrist. The mother, however, had him baptized, and he became a Christian, but retained his magical powers. His prophetic gifts were soon enlisted in the favor of the kings of Britain; through him Uther-Pendragon won his bride, the mother of Arthur and M. until he finally disappeared from the earth as Arthur's counsellor.

MERLIN 'OF DOUAI,' PHILIPPE-ANTOINE, COUNT (1754-1838), Fr. statesman and jurisconsult; pres. of Convention and member of Committee of Public Safety, 1793; one of Directory; used influence on side of moderation when safe to do so.

MERMAIDS AND MERMEN, in folk-lore sea-dwelling beings, half human, half fish. The mermaid is usually represented as a beautiful woman to the waist, but having a fish tail; she has exceptionally fine hair, which she combs with a golden comb and studies in a golden miror. Mermaids were sometimes supposed to wed mortal men, and mortal maids were sometimes enticed to the sea by mermen.

MEROË, 'ISLE' OF (15° 30′ N.; 34° E.), district, S. Nubia, almost surrounded by Nile, Blue Nile, and Atbara; contains ruins of Meroë, capital of ancient Ethiopia.

MEROVINGIANS, first Frank dynasty; named from ancestor Merovech, almost mythical ruler of V. cent.; ruled until 751, when throne was seized by Pippin, founder of Carolingian dynasty.

MERRICK, LEONARD (1864), Brit. author. A collected edition of his works, with introductions by some of most famous writers of the day, was issued in 1918. Among his publications are *Conrad in Quest of His Youth, The Position of Peggy Harper, The House of Lynch, While Paris Laughed*, and the plays *When the Lamps are Lighted, The Elixir of Youth*, and (with G. R. Sims) *A Woman in the Case.*

MERRILL, a city of Wisconsin, in Lincoln co., of which it is the county seat. It is on the Chicago, Milwaukee and St. Paul Railroad, and on the Wisconsin and Prairie rivers. It is the center of an important lumbering

region and has sah and shoe factories. There are several important public buildings and city parks. Pop. 1920, 8,068.

MERRIMAC. See MONITOR AND MERRIMAC.

MERRIMAC RIVER, runs through New Hampshire and Massachusetts, forming in the first-named state near Franklin where the Winnipisaukee and Pemigewasset join. It flows southward through Massachusetts and enters the Atlantic at Newburyport. Its length is about 150 miles and its course is broken by falls and rapids, from which immense water power is obtained for cotton mills and other plants at Lowell, Lawrence and Manchester. It has a drainage area of 4,864 sq. miles.

MERRIMAN, HENRY SETON, pseudonym of Hugh Stowell Scott, 1863-1903, Eng. novelist; among novels are *The Last Hope* and *Barlasch of the Guard.*

MERRITT, WESLEY (1836-1910), American soldier; *b.* in New York; *d.* in Washington, D.C. He graduated from West Point in 1860, fought with distinction throughout the Civil War and was promoted major for valor at Gettysburg. After the battles of Yellow Tavern and Winchester he was brevetted major-general. He was on frontier duty, 1865-82, then superintendent of West Point, and in 1887 at Fort Leavenworth, Kansas, in command of Department of the East, 1897-98 and of the U.S. troops in the Philippines. After the Spanish-American war he was one of the U.S. Peace Commission in Paris. He retired in 1900.

MERSEBURG (51° 21′ N., 12° E.), town, on Saale, Prussian Saxony, Germany; cathedral and castle; machinery and leather. Pop. 25,000.

MERSEY (53° 20′ N., 2° 55′ W.), Eng. river; rises in N.W. Derbyshire, flows westward, and falls by an estuary into Irish Sea; length, 70 miles; navigable to mouth of Irwell.

MERTHYR TYDVIL (51° 45′ N., 3° 22′ W.), town, Glamorgan, S. Wales; great coal, iron, and steel center; one of most important iron-smelting towns in country. Pop. 1921, 80,161.

MERV (37° 32′ N., 62° 21′ E.), oasis, Asiatic Russia; taken by Russia, 1884; produces cereals, fruit; livestock raised. Pop. 175,000. Ancient town of Merv dates back to time of Alexander the Great; it belonged successively to Parthians, Arabs, Seljuks, Mongols, Uzbegs, Persians, Bokharians, Turkomans, Russians; new town has pop. 9,000.

MERWIN, SAMUEL (1874), author; *b.* Evansville, Ind. He was educated at Northwestern University and attained popularity as a novelist. In 1908 he published *Drugging a Nation* after visiting China to study the opium question. From 1905-11 he was associate editor and editor of *Success* magazine.

MESA, high table-land of small extent, rising above the surrounding plain. It is frequently used to describe such points of land in the United States bordering Mexico.

MESHED (36° 15′ N., 59° 41′ E.), walled town, Khorasan, Persia; has magnificent mosque, which contains sacred shrine of Imam Reza, annually visited by many pilgrims of Shiite sect; manufactures carpets, shawls; formerly an important trade center. Pop. *c.* 60,000.

MESMER, FRIEDRICH ANTON (1733-1815), Austrian physician; interested first in astrology and magnetism; promulgated his theory of animal magnetism, believing in the existence of a force in the atmosphere and in himself, with a strong influence on other persons, through which he professed to cure disease; posing as a magician, had great success in Paris.

MESMERISM. See HYPNOTISM.

MESOPOTAMIA, 'the country between the rivers' Euphrates and Tigris, Asia (35° 30′ N., 41° 30′ E.); name is most correctly applied to area N. of Bagdad, that between the city and Persian Gulf being Irak Arabi (now Lower Mesopotamia). Surface is low-lying plain S. of Kurdistan and between Pers. and Arab. highlands. Climate is hot and dry in summer, cold in winter; winter rains are very scanty, Bagdad, 8½ in. Cultivation is possible chiefly under irrigation, and schemes to restore ancient canals and develop new areas, partly carried through, will vastly increase productive area. Only 8 per cent. of surface is under cultivation at present; the remainder is a wilderness of desert and swamp. The products are rice, wheat, barley, cotton, tobacco, and dates. Petroleum is found. Exports are dates, grain, wool, hides, and licorice. Communications by road, rail, and river are opening up the country. Area, 143,250 sq. m.; pop. *c.* 2,000,000. Bagdad is the cap., Basra the chief port. See ASSYRIA; BABYLONIA. See map, SOUTHERN ASIA.

In prehistoric times Mesopotamia was a center of radiation of population,

racial traits and traces of its religious cults being found in the early races of Egypt, as represented in the empire in 13th cent. B.C., and in 7th cent. was again held by the Babylonians, from whom it was subsequently taken by the Medes; conquered by Cyrus of Persia, *c.* 538 B.C. and was included in conquests of Alexander the Great, *c.* 330 B.C.; was among the dominions of Parthia under Mithridates the Great, 2nd and 1st centuries B.C.; taken by the Romans under Trajan, A.D. 115; conquered by Sapor of Persia, 258; by Emperor Galerius, 298; was part of Arab. empire in 7th cent., and was included in dominions of the caliphs; overrun by Mongols in 13th cent.; taken by Turks, 1516. Under the Turks the land was allowed to revert to desert, for irrigation was neglected. By the treaty with Turkey, Mespotamia is recognized as an independent state, subject to the rendering of administrative advice and assistance by a mandatory until such time as they (the Arabs) are willing to stand alone, (Covenant of League of Nations).

Campaign in Mesopotamia.—On the declaration of war by Turkey, Nov. 1914, the Poona Brigade, stationed at the island of Bahrein, a Brit. possession in the Persian Gulf, was moved to the Shatt-el-Arab, Nov. 7. On Nov. 21 an advance was made to Basra, which had been evacuated by the Turks. In Jan. the advance was continued to Kurna, at the junction of Tigris and Euphrates, and it was decided to press still farther into the interior. In April a second division arrived, and the whole force was put under the command of General Sir John Nixon. The Turks were driven back up both rivers. Amara on the Tigris fell on June 3, and Nasirieh on the Euphrates next day. By a brilliant forced march Major-general Sir C. V. F. Townshend reached Kut-el-Amara, Sept. 28, and was ordered against his own inclination to make a bid for Bagdad. He defeated the Turks at Ctesiphon Nov. 22, but at such a heavy cost that he had to retire hastily to Kut, where he was invested by the now superior Turk. forces, Dec. 3. A relief force was speedily organized under Lieut.-general Aylmer and drove the Turks from Sheikh Saad, Jan. 9, 1916 to Umm-el-Hannah, but in several attacks, Jan. 19-23 failed to dislodge them. After a period for rest and reorganization the attempt was renewed early in March. After a difficult night march across the enemy's front, the attack was renewed several times during the day, but in vain, March 7. A few days later Lieut.-general Sir Percy Lake, who had succeeded General Nixon, appointed Major-general Sir G. F. Gorringe to replace General Aylmer, and a renewed attack was planned on the l. bk. Umm-el-Hanna and Falahiyeh were brilliantly carried by the 13th Division under Lieut.-general Sir Stanley Maude, April 4, but the attack on Sanna-i-yat was unsuccessful, April 9. Another attempt was made on April 17, and although Beitissa, S. of the river, was taken, progress was still barred on the other side.

In Aug. 1916 General Maude was promoted to the supreme command. While the enemy was being contained on the l. bk. of the Tigris, another force under Lieut.-general W. R. Marshall, by a wide detour to the S., secured a position on the Hai, the old bed of the Tigris, which stretches from Kut to Nasiriyeh on the Euphrates, Jan. 4. After nearly two months of hard fighting, the enemy's communications were closely threatened above Kut, and when passages were secured across the river he was compelled to beat a hurried retreat, Feb. 24, and narrowly escaped disaster. He was so harried that he could not make another stand before the line of the Diala, a few miles below Bagdad, which was soon outflanked on the right, and the Turks again took flight. On March 11, 1917, the British entered Bagdad, and three days later were 30 m. beyond, while another force proceeded up the Diala to Bakuba in the direction of Teheran, from which the Russians were advancing through Persia, establishing contact with the British S.W. of Khanikin, April 4. Samarra, the terminus of the railway N. from Bagdad, was occupied, April 23, and the Turks were retreating towards Mosul. Meantime the Turkish troops on the Euphrates had been withdrawing; they were caught at Ramadie and, after the strong positions which they held had been stormed, surrendered, Sept. 29. A new base which the Turks established at Tekrit, 100 m. beyond Bagdad, for a fresh offensive, was surprised and taken, Nov. 2. On Nov. 18 General Maude died suddenly at Bagdad from cholera. He was succeeded by General Marshall, who pressed the Turks farther back towards Mosul. On Oct. 30, 1918, Turkey signed the armistice which brought operations to a close. See HEDJAZ, IRAK.

MESOZOA, small group containing a few simple and minute animals, which consist of an outer layer of ciliated cells surrounding a varying internal mass. The majority are parasitic in the bodies of Cephalopods, Turbellarian and Nemertean worms, and Brittle-stars. Most authors regard them as lowly Metazoa, linking these to Protozoa, but some consider their relationship to be with Trematode worms.

MESOZOIC. See GEOLOGY.

MESQUITE, a shrub or tree found in the United States and Mexico. Its wood is of a brown and red color and is hard and susceptible to fine polish. Its fruit pod, called mesquite bean, is used as a fodder for cattle.

MESSALLA CORVINUS, MARCUS VALERIUS (64 B.C.-A.D. 8), Rom. general; took republican part against Cæsar; deserted it after *Philippi*, 42; consul, 31; suppressed Aquitanians and enjoyed triumph, 27; distinguished patron of letters; writings lost.

MESSAPII, tribe of ancient Italy; dwelt originally in Calabria, which was also called *Messapia*. All that is known of their language is found in a certain number of inscriptions which were collected by Mommsen. According to Herodotus they defeated the Greeks of *Tarentum*, 473 B.C., and were traditionally subjects of Minos, king of Crete.

MESSENE, a strongly fortified city of ancient Messenia, founded by Epaminondas, 369 B.C., and situated at foot of hill of Ithome.

MESSENIA (*c.* 37° 10′ N., 21° 55′ E.), monarchy, Greece; settled by Dorians in early times; conquered by Sparta, VIII. cent. B.C.; Messenians rose in rebellion in VII. cent. and again in 464; returned in 371 B.C., and remained an independent community till coming of Romans, 146 B.C. Pop. 130,000.

MESSIAH (in New Testament, *Messias*) is from the Gk. form of the Hebrew —'the anointed one.' From early times anointing has been thought to convey a sacred character (compare the anointing at the coronation of Eng. kings), and priesthood and kingship were at first intertwined. The idea of Messiahship among the ancient Hebrews only appears after the exile, when the monarchy was no longer and a national redeemer was looked for. It grew in intensity under foreign domination, and in the two cent's before the birth of Christ the expectation of a Messiah-King was part of the circle of eschatological ideas. A suffering Messiah was not expected, hence the difficulty for Jews in accepting Christianity. The belief in the future coming of a Messiah is still part of the creed of every orthodox Jew. The Messianic expectations are shown specially in the *Psalms of Solomon*. Belief in a Messiah has existed far outside Judaism. It appears in the ancient Indian Scriptures, and the Babylonian god, Marduk, has Messianic attributes. Parallels likewise exist elsewhere—even among the North Americans.

MESSINA (38° 12′ N., 15° 33′ E.), fortified seaport, Sicily, Italy; capital of province M.; on Strait of M.; had several fine churches, Villa Rocca Guelfonia, museum, univ. 1549, excellent harbor, etc. Ancient *Zancle* (the Sickle), was founded *c.* 732 B.C.; successively conquered by Carthaginians, Romans, Saracens, Normans, Spaniards, 1282, and Italians, 1860; destroyed by earthquake, 1783; and again, Dec. 28, 1908; chief industries—muslin, silk, linen, coral ornaments, essences; exports oranges, lemons, citrons, wine, almonds, walnuts, pumice-stone, etc. Pop. 130,000. Province of Messina has area of 1245 sq. miles. Pop. 520,000.

MESSINA, STRAIT OF (ancient *Mamertinum Fretum*), separates Sicily from Italy, and has a length of 24 m. with a breadth varying from 2½ m. to 12 m. Here are to be found the Scylla and Charybdis of Greek mythology, the former a rock off the small town of Scylla, the latter a rapid or whirlpool in front of the harbor of M.

MESSINES, comm., W. Flanders, Belgium (50° 44′ N., 2° 54′ E.), 6 m. S. of Ypres; alt. 212 ft. on low ridge of strategical value; figured largely in fighting during World War. Vil. held by Allenby's cavalry, Oct. 1914; captured by Germans, Nov. 1; ridge and ruins of vil. recaptured, June 7, 1917 after a seven days' bombardment and explosion of a score of huge mines; lost during Lys battle, April 1918, but recovered, Oct. 14, 1918. See WORLD WAR.

METABOLIC DISEASES is a general term including such functional disturbances as affect the general nutrition of the body. See CRETINISM, DIABETES, GOITRE, GOUT, MYXOEDEMA, RICKETS, RHEUMATISM.

METABOLISM, term applied to the chemical changes which take place in living cells, by which energy is provided for vital activity. See PHYSIOLOGY; ANIMALS.

METALLOGRAPHY is the study of the internal structure of metals and alloys in relation to their composition and properties. The methods are twofold—thermal and microscopic. The *thermal* method consists in observing and mapping curves of the rate of cooling of the fused material, to discover changes of state, and interpret the phenomena by the phase rule. The *microscopic* method consists in the examination of the illuminated surfaces of prepared slabs of metal by microphotography; characteristic crystalline markings are thus recorded.

METALLURGY is the science of the properties of metals and the means by which they are extracted from their ores. These properties are: density, fusibility, tenacity, elasticity, ductility, malleability, conductivity. Metals may occur native (uncombined), or as oxides, sulphides, carbonates, etc. The processes of extraction generally include crushing the ore, roasting to oxide, if possible, and smelting in a furnace with fuel to reduce oxide to metal. Fluxes remove gangue as slag; lastly, the metal is refined. Practical details include the construction of furnaces, lined with suitable refractory materials, and the preparation and valuation of the solid or gaseous fuels to be employed. See ELECTRO-METALLURGY.

METALS. By reason of certain properties, mainly physical, which are common to a large number of the elements and more or less absent in others, the elements are divided into two classes—*metals* and *non-metals*. From earliest days M. have been distinguished from all other substances by their peculiar properties, and applied to useful purposes. In the earliest history we have records of the use of the seven M., gold, silver, lead, copper, iron, tin, and mercury. The M. are usually opaque, their smooth surfaces reflect light to a high degree, giving them the property known as metallic lustre; they are good conductors of heat and electricity. Gold, silver, copper, lead, tin, etc., are metals; sulphur, bromine, hydrogen, phosphorus, etc., non-M. All M., except mercury, are solid, and most of them will crystallize. In the processes of electro-chemical deposition (see ELECTROLYSIS) M. act like hydrogen, and are always set free at the cathode. The non-M., on the other hand, may be either gases, liquids, or solids, possessing little tenacity. They do not give the peculiar metallic lustre, and are bad heat and electricity conductors. Their specific gravity varies from being lower than that of water (*e.g.*), potassium, to being more than twenty times heavier (*e.g.*), platinum. Similarly, while some (*e.g.*), sodium, are very soft, most of them are hard. Some, like antimony, are quite brittle, while others, like iron, possess great tenacity. The two classes of M. and non-M. merge into one another, and certain elements are placed sometimes in one class and sometimes in the other, according as the distinction is based on physical or chemical properties. Arsenic, for example, possesses many of the physical properties of a M., but in its chemical reactions it is more nearly allied to the non-M. Such elements as these are known as metalloids. The chief chemical properties of M. include their strong affinity for certain non-metallic elements (*e.g.*), sulphur, chlorine, and oxygen, with which they form sulphides, chlorides and oxides. The metallic oxides are solid white or colored bodies with an earthy apperarance, and it is only such metallic oxides which give rise to *hydroxides* when united with water. Such oxides are known as *basic* or *salt-forming* oxides. The lower oxides form *salts* (*q.v.*) in combination with the oxy-acids. M. will, when fused, enter into combination with each other, forming *alloys* (*q.v.*). Because of their strong affinity for other elements, M. are generally found combined with other elements, and consequently they have to be extracted from their ores by processes described under METALLURGY. The M. may be classified into (1) LIGHT METALS: (*a*) *alkali metals* (*e.g.*), potassium; (*b*) *alkaline earth metals* (*e.g.*), calcium; (*c*) *earthy metals* (*e.g.*), aluminum; and (2) HEAVY METALS: (*a*) *metals whose oxides form strong bases* (*e.g.*), iron; (*b*) *those whose oxides form weak bases or acids* (*e.g.*), arsenic; and (*c*) *noble metals* (*e.g.*), gold. Another method of classification adopted more generally now, is to take them in their order as suggested by the periodic system. Under this system the M., taking only the commoner ones, would be divided into: (1) the alkalies, potassium, rubidium, caesium, sodium, and lithium; (2) the alkaline earths, calcium, strontium, barium; (3) the magnesium group, beryllium, magnesium, zinc, cadmium, mercury; (4) the aluminium group, aluminum, gallium, iridium, thallium, and the gadolinite earths (didymium, yttrium lanthanum, erbium, scandium); (5) the noble metals, copper, silver, and gold, and the platinum metals (ruthenium, rhodium, palladium, osmium, iridium, and platinum); (6) the iron group, iron, cobalt, and nickel; (7) manganese; (8) the chromium group, chromium, molybdenum, tungsten, and uranium, (9) the tin group, germanium, tin, lead, and titanium, zirconium, cerium, and thorium; and (10) the arsenic group, arsenic, antimony, bismuth, and vanadium, niobium, and tantalum.

METAL WORK. Metals mostly used for art metal work are gold, silver, bronze, iron, and lead. Copper and tin have been employed alone, but their great use has been in forming bronze. The adaptability of gold and silver for almost any treatment has led to their use for the finest work, bronze being used chiefly for casting. The main use of iron is in large work requiring strength

along with lightness. Metals are worked principally by casting or by hammering and punching. More metal is used in casting than in hammering, and therefor casting has been employed more for bronze than for the costlier metals.

The earliest *castings* were made by pouring fluid metal into moulds of clay, sand, or stone, and were therefore solid. Later, an iron core was used. Finally, however, castings became little more than a thin layer of metal round a clay core. In early *hammer-work* a block of wood was cut roughly into the desired shape, and the metal was hammered over it. A later and more satisfactory method was that of laying the metal upon an elastic mixture of pitch and pounded brick, and beating it from the back. This method was employed with bronze by the Greeks and the Assyrians, and with precious metals by the workers of the Middle Ages. Little is definitely known of the earliest Gr. work, but according to Homer the ancient Greeks had great skill in fashioning bronze and the precious metals. The Greeks frequently ornamented their bronzes with inlays of gold, silver, or precious stones. The Romans were skilful workers, but largely imitated the Greeks. After the fall of the Roman Empire, Byzantium became the center of the art, and Byzantine artists executed the gold and silver work for St. Peter's, Rome, during the 6th-8th century, and the wonderful gold and enamel work on the altar front on St. Mark's, Venice. 11th cent. Byzantine workers also produced fine bronze work, especially cathedral doors. Ital. artists gradually learnt Byzantine methods, and their work became celebrated. The magnificent gilt-bronze candelabrum in Milan Cathedral dates from the 13th cent., and every description of metal work was produced by the Florentine artists of the 15th cent.—notable examples being Ghiberti's doors in the baptistery, Florence.

In England, fine eccles. work in precious metals was done in Saxon times, and 13th cent. wrought-iron work was specially good. Among Ger. work the cast-bronze doors of the 10th and 11th centuries and the bronzes of the 15th cent. Augsburg and Nuremberg workers are famous. In France the Limoges artists were remarkably expert in all kinds of metal work, particularly enamel-ornamented brass, and Fr. designs for decorative doors became celebrated. In the time of Shah Abbas the Great, 1585-1628, Pers. work reached a high standard, especially gilt brass work with inlays of gold and silver. During early Victorian times metal work in England fell to a low level. The foundation of a revival was laid largely by the efforts of the Prince Consort, and the publication of a treatise by Digby Wyatt, but it is only during comparatively recent years that a modern school of art metal work has come into being, producing work in new combinations of metals, with colored wax, stained ivory, enamel, etc. Modern Fr. work is distinguished by its great refinement, and Jap. and Chin. work still maintains its excellence.

METAMERISM. The body of some bilaterally symmetrical animals is divided into successive segments, (*i.e.*) divided into segments or *matemeres*, similar chambers of the body cavity in which organs are repeated.

METAMORPHISM, a name used to describe the change which takes place in certain rocks when subjected to subterranean heat, extreme pressure, or to chemical action. Both their structure and mineral character are altered, and they lose their original sedimentary nature and become hard, shining, and crystalline, being, in fact, transformed into entirely new types. Thus limestone may be changed into marble, granite into gneiss, coal into graphite, etc.

The term *Metamorphic* was introduced by Sir Charles Lyell. M. rocks have a well-defined character, are of great thickness, and cover large areas in many parts of the globe.

METAMORPHOSIS. Though formerly more generally used in treating of development, this term is now restricted to a series of changes from egg to adult, where, to meet a special environment, the introduction of an intermediate or larval stage is necessary in the life-history of a species. The occurrence of a *larva* is general in aquatic forms, especially when marine, but is rarer in terrestrial animals, insects being the most specialized in the last group.

METAPHOR, figure of speech in which one thing replaces another resembling it, (*e.g.*) 'He was a lion in the fight.' A Simile introduces a comparison (*e.g.*) 'He fought like a lion.' In a *mixed metaphor* the images are confused, (*e.g.*) 'To take arms against a sea of troubles'.

METAPHYSICS, the inquiry into the nature of Being and of the fundamental ideas connected with it. In its widest usage metaphysics includes *Ontology* and *Epistemology*. Kant limits it to the latter. Wolff divides metaphysics into ontology, dealing with existence in general and rational psychology, cosmology, and theology, the sciences respectively of the nature of the soul, the world as a whole, and of

God. The term itself is taken from the position after the Physics of Aristotle (*meta ta physika*) of a treatise dealing with 'being as being,'—(*i.e.*,) ontology. This ontological inquiry into the nature of the unity behind the multiplicity of phenomena was the main pursuit of the Gr. metaphysicians. Later thinkers have inquired into the process of knowing. Nevertheless, modern metaphysics tends to return to the Gr. inquiry into being as being, for the theory of knowledge of the epistemologist must at the same time also be a theory about things as being.

Modern Metaphysics.—Aristotle inquired the nature of being as being, not always making clear whether we can really know the things whose existence he affirmed. Modern metaphysicians, on the other hand, ask rather what are the things we know, and thus treat ontology in close connection with epistemology, the theory of knowledge.

According to the importance placed on matter and mind, modern metaphysical systems may be classed as *Materialistic* or *Idealistic*, with *Realism* as an intermediate doctrine. *Materialism*, in its modern sense, holds that all we can know is body, of which mind is a function. Its development in the middle of the 19th cent. is due to the rapid advances in science, under Lavoisier, Lamarck, Laplace, and Lyell, in commerce, manufactures, and industrialism. Its leading exponents of this period are Moleschott, Vogt (who taught that thought is related to the brain in the same way as the bile to the liver), and Büchner, with his doctrine of life as due to the spontaneous generation of certain combinations of matter under favorable circumstances. More recently, Haeckel has identified substance with body, of which mind is an attribute, and has traced the evolution of all organisms from a single cell originated by spontaneous generation from inorganic carbonates. Conscious soul is a mere function of brain; soul is a function of all substances; God is the force or energy of nature. Tendencies towards materialism are found in Comte's denial of God and the soul, in Spencer's definition of evolution, and in the writings of Huxley and Tyndall.

Metaphysical Idealism, which affirms that objects of knowledge are mental, develops, from Descartes to Fichte, out of the psychological idealism according to which we perceive only mental objects. The *dualism* of Descartes tends to idealism through the emphasis placed on the will of God; Spinoza's *pantheism* does not reduce extension to thought, but only affirms the same substance as at once extended and thinking; Leibniz comes nearer metaphysical idealism with his doctrines of monads, simple, indivisible, unextended substances, capable of perception and appetite. In England, Locke's reference of primary qualities to external things is followed by Berkeley's doctrine of ideas as the objects both of perception and of knowledge, and by Hume's denial of substantial souls. Kant teaches the combination by the synthetic understanding of a world of sensation into phenomenal objects of experience (*Transcendental Idealism*). Fichte takes the final step by denying things in themselves and making the not-self the product of the Ego. This is *Noumenal Idealism*; the mental things we know are not mere phenomena of sense, but noumena. After Fichte are various forms of idealism, varying in their definitions of what the noumenal mental world consists. Schelling identifies the noumenal Subject and Object; these are products of the Absolute Ego, which is known by an intellectual intuition; Hegel affirms the differentiation of Absolute Reason into Subject and Object, and the identity of both; according to Schopenhauer, the world as phenomenal is idea, as noumenal, will; with von Hartman, the world as noumenal is both unconscious intelligence and unconscious will; Lotze regards nature, or bodies moving in time and space, as a system of phenomena caused in us by the activity of God, but as in itself the system of the universal actions of God's infinite spirit aiming at a supreme Good; Fechner sees in the universe a communion of spirits; the souls of plants, animals, men, are different members of the soul of the world (*Panpsychism*). Later Germans, Lange and Mach, returning respectively to Kant and Hume, hold that we perceive at first and know finally only phenomena of sense (*Phenomenal Idealism*). In England, Hume's phenomenalism has influenced the Mills, Bain, and Spencer. Kant and Hegel have found interpreters in Caird, Green, Bradley, Laurie, and Martineau. Recently, a school of Personal Idealists (Pringle - Pattison, Schiller, Hastings Rashdall), protest against all Idealist systems which merge all minds in one, and thus exclude personality and responsibility; we have in consciousness a sure proof of a real and indivisible self (See PERSONAL IDEALISM, Oxford, 1902).

Metaphysical Realism regards both mind and body as substances. Descartes and Locke are Psychological Idealists but Metaphysical Realists. In Germany the leading Realists are Trendelenburg (1802-72). Dühring, Günther (1783-

1863), and von Kirchmann (1802-84). In France, the *Spiritualistic Realism* of Cousin lays stress on spirit rather than on body. British Realism is represented by the Scot. philosophers Reid, Stewart, Hamilton, and more recently by Mansel, Veitch, and Calderwood; an immediate perception is affirmed of an external world, taken to consist of matter, not of ideas. The *Hypothetical Realism* of Shadworth Hodgson (1832-1912), Martineau, and A. J. Balfour supposes that we infer a material something on perceiving a mental something.

Metaphysical systems may also be classified as *monistic* or *dualistic*, according as they affirm one or two forms of reality. Those who believe only in mind and those who believe only in body are equally monists; thus Spinoza is materialistic monist, Hegel an intellectualistic. Monism and dualism are not really opposed, since conceivably one kind of reality may be neither body nor soul entirely—(*e.g.*), the Realism of Aristotle is a monism of substance and a dualism of body and soul. Dualism may affirm either that mind and matter are absolutely heterogeneous, with no causal relation between them, or that mind cannot know matter in itself, though compelled by its own laws of cause and effect to assume matter as the origin of sensations. A third term, *pluralism*, assumes more than one principle of being. An Institute of International Metaphysics was opened at Paris (1919).

METAPONTUM, colony in Italy, founded by Achæans, *c.* 700 B.C.; inhabitants aided Hannibal and fled with him, 207 B.C. Pythagoras taught here.

METASTASIO, PIETRO, TRAPASSI (1698-1782), Ital. poet; *b.* Rome; protégé of Rom. lawyer, who left him his wealth; 'discovered' by La Romanina, the great singer, he became world-famous as writer of librettos, his plays being set to music; app. Court Poet at Vienna, 1729, where he died.

METAURUS (43° 47′N., 13° E.), small river, Umbria, flowing into Adriatic; modern Metauro; on its banks Romans defeated Carthaginians 207 B.C., Hasdrubal being killed.

METCALF, VICTOR HOWARD (1853-1914), lawyer and former Secretary of the Navy; *b.* Utica, N. Y. He graduated in 1876 from the Yale Law School, was admitted the following year to the New York bar, first practiced in Utica, and in 1881 pursued his profession in San Francisco, retiring in 1904. He represented California in Congress from 1899 to 1904, when he entered the cabinet of President Roosevelt, first as Secretary of Commerce and Labor (1904-6) and then as Secretary of the Navy (1906-8).

METCHNIKOV, ELIE (*b.* 1845), a Russian bacteriologist; *b.* in the Kharkov gov. In 1870 he was appointed professor of zoology at Odessa, and later he became director of the Odessa bacteriological institute. He went to Paris in 1890 and studied under Pasteur, and and four years later became professor at the Pasteur Institute, Paris. He is a member of the Académie de Médecine, foreign member of the Royal Society of London, and of the Académie des Sciences, and has been awarded the Nobel Prize for medicine. His views are expounded in his *Immunity in Infectious Diseases* (Eng. translation 1906). His other publications include: *The Prolongation of Human Life*; *The Nature of Man*; *Optimistic Essays*, and monographs on *Insects*, *Scorpions*, *Centipedes*, *Sponges*, *Worms*, etc.

METELLUS, name of Rom. family of *gens Caecilia*, Chief members: (1) Lucius Cæcilius Metellus, who distinguished himself in first Punic War, 251 B.C., and rescued Palladium from flames in temple of Vesta. (2) Quintus Cæcilius Metellus Macedonicus (*d.* 115 B.C.), who made Macedonia a Rom. province; one of first two plebian censors, 131. (3) Quintus Cæcilius Metellus Numidicus, consul, 109; defeated Jugurtha in Numidia. (4) Quintus Cæcilius Metellus Pius, consul, 80. (5) Quintus Cæcilius Metellus Pius (Scipio); *s.* of Scipio Nasica; adopted by (4); Pompey's f.-in-law.

METEMPSYCHOSIS, called popularly Transmigration of Souls, the belief that our life here is only one of a series of incarnations in the past and future. A human soul can so inhabit the body of another human being or an animal. It is very prominent in Hinduism, whence it has been taken over by Western theosophists.

METEOR. — Meteors, commonly known as 'shooting stars,' are dark bodies, revolving around the sun, or drawn to solar system from outer space, which happen to meet the earth. Their rate of travel is so great that the friction caused by their passage through our atmosphere renders them incandescent, and we on earth, below, see a streak of light in heavens. It is supposed that they commence to glow at a height of about 80 or 90 miles, and move at a speed of anything up to 20 miles a second. They seldom get nearer than 10 or 15 miles from earth's surface.

and are very small bodies, as a rule not weighing more than a few ounces, if so much.

METEORIC SHOWERS. On certain nights a greater number of meteors are seen than at ordinary times, and these are known as meteoric showers. While meteors are solitary stray bodies, meteoric showers are caused by swarms of meteors moving in orbits round the sun, which orbits intersect that of the earth, and when the earth happens to be at the point of intersection at the same time as the meteor swarm, a meteoric shower is seen. Connection has been established between certain swarms and comets, and it is believed they are really the débris of disintegrated comets.

The principal meteoric showers, with the constellations from which they radiate, are as follows:—

Quadrantids, Jan. 2, 3, from Corona Borealis. Ursids, Mar. 24, from Ursa Major; Lyrids, Apr. 20-23, from Lyra; Perseids, Aug. 10-14, from Perseus; Leonids, Nov. 13-15, from Leo; Andromedids, 17-23, from Andromeda; Geminids, Dec. 10-12, from Gemini.

METEORITES (Gk. *meteoros*, 'raised up on high'), masses of mineral matter which sometimes fall to earth from the sky. M's are divided into three classes: (1) *Siderolites*, composed of iron and stone; (2) *siderites*, composed chiefly of iron; and (3) *aerolites*, composed entirely of stone. Some of these bodies weigh many pounds, while others have been found (but none actually seen to fall) weighing tons; from the composition of these latter there is no room for doubt they have an origin of this nature. A curious fact is that no fossil meteorites have ever been discovered.

METEOROLOGY, the science of the atmosphere, particularly in its relation to weather and climate. The meteorological elements whose study is thus included are the temperature, pressure, and humidity of the air; the direction and speed of the wind; the amount of rainfall, including snow and hail; the duration of bright sunshine; the nature, amount, and motion of the clouds; the occurrence of such phenomena as thunder-storms, aurora, etc. Now the *atmosphere* is a gaseous envelope, subject to gravity, lying on a spheroidal surface, of which three-fourths is water and one-fourth is land, and on which the distribution of water and land is unsymmetrical. Further, this surface is in rotation on its axis at a comparatively high speed. Lastly, the atmosphere is affected directly and indirectly by solar radiation. This brief statement will show that the elucidation of the physics of the atmosphere, so that the diurnal and annual march of phenomena may receive particular explanation, and so that the occurrence of non-priodic phenomena may be predicted, is a problem of an exceedingly complex kind. All that is possible here is to indicate the methods by which it has been attacked.

In many places there are fully equipped weather *observatories*, at which, either by self-recording instruments or by hourly eye readings taken day and night, a continuous record of the values of the meteorological elements is obtained. At a large number of stations one or more of the elements is observed at a fixed time or times daily. The data so obtained may be utilized in different ways, the chief of which are (1) the preparation of climatological data, (2) weather forecasting, and (3) the investigation of special problems.

Before dealing with these, it has to be mentioned that the meteorological elements undergo variations of three kinds. The first is the change due to the axial rotation of the earth, which at any instant brings one-half of the earth and its overlying atmosphere under the influence of solar radiation. In consequence there is a diurnal variation of temperature, pressure, humidity, etc., at each point of the earth's surface. Secondly, owing to the obliquity of the ecliptic and the consequent changing declination of the sun throughout the year, there is an annual variation which marks the seasons. Thirdly, over and above these periodic changes, there are aperiodic or irregular fluctuations frequently large enough to mask the diurnal change and to reverse, for the time being, the effects of the annual change.

Treating meteorological observations, from the climatological point of view, the object, therefore, is to obtain in the first place the average value of each element at the locality of observation. As an example, we may take the temp. of the air. If observations of temp. be made at each hour on a particular day, the average of these twenty-four readings will give a fairly accurate estimate of the mean temp. of that day. Doing this for a month—adding together the mean daily temperatures and dividing the sun by the number of days in the month—we obtain the mean temp. for that month. Similarly, the average of twelve successive mean monthly temperatures will give the mean annual temp. of the place. It should be mentioned here that the average of all observations taken at a particular hour of the day over a sufficiently long period gives the mean temp. for that hour.

Similarly, we can obtain the mean temp. for each hour of the day, and the figures so obtained will represent the diurnal variation of temp. Mean monthly temperatures may be grouped in the same way to give the annual variation of temp.

Suppose now that observations of this kind have been taken at a large number of places on the earth's surface, and that we take the mean temp. for Jan. at each. Marking these on a map of the earth, we can draw a line through all places where the mean temp. at that season is, say, 50° F. We should find it to be a line which, in the northern hemisphere, passes from Amoy, through Tibet, Afghanistan, N. Persia, Asia Minor, S. Greece, S. Italy, Corsica, central Spain, Cape Finisterre, then northwards to the W. of Land's End, across the Atlantic to Charlestown, and after crossing the U.S. and through Brit. Columbia, it traverses the Pacific. In the southern hemisphere it is a line passing round the globe in an average latitude of about 48° S., and only approaching land in the vicinity of Cape Horn. These, then, are the *isothermals* (*i.e.*, lines of equal temp.) of 50° F. for Jan. Similar lines can be drawn for other temperatures, and the whole series gives a map from which important conclusions can be drawn, especially when compared with a similar isothermal map for July, the opposite season of the year. Again, with atmospheric pressure we may draw *isobars*, or lines of equal pressure, on a map; and so on for any other meteorological elements whose distribution has to be studied.

Turning now to the second purpose for which meteorological observations may be made, we have to consider the *forecasting* of weather. In many countries arrangements are made whereby observations made at a certain hour at a number of stations are telegraphed to a central office, where they can be compiled into a *synoptic chart*, showing for the area under consideration the principal meteorological elements.

Accumulated experience in the compilation of weather charts has led to the recognition of certain fairly well-defined types of disturbance or change, to a knowledge of the direction in which and the speed with which these generally travel, and of the results they produce in the several parts of the areas they affect. The chief are the cyclone, anticyclone, V-shaped depression, secondary depression. With the experience referred to it is possible to predict with tolerable certainty what will happen in the area through which the disturbance travels.

The use to which meteorological observations may be put is the investigation of special problems. Of these there are, of course, a very large number. The following may be mentioned as typical instances: (1) the diurnal variation of pressure and temp., a matter of some importance in connection with the diurnal changes in magnetic declination. (2) The law of the diminution of temp. with increasing height above sea-level. This has been investigated in recent years chiefly by the aid of sounding balloons, and has resulted in the discovery of the *isothermal layer* of air, which (in temperate latitudes) occupies a stratum about 6 m. above sea-level. (3) The relation of wind velocity to barometric gradient. (4) The inclination of wind direction to a given system of isobars. (5) The oscillations of the atmosphere on a large scale—a matter of some importance in the forecasting of Indian monsoons. (6) The detection of periodicity in annual mean values of a given meteorological element and the comparison of seasonal changes at once place with others at another place at a subsequent date.

Atmospheric Electricity.—The phenomena of thunderstorms show that the atmosphere is capable of being charged in different parts to different electric potentials. This state of electrification is usually investigated by means of Kelvin's water-dropping collector. This consists of a metallic vessel containing water, insulated from the earth, and from which the water issues through a stopcock to a long tube the end of which is at the point whose electric potential is required, and at which the water falls in drops. Each drop as it leaves the tube is charged oppositely to the electrification of the air in its immediate vicinity. Consequently, if an electrometer be connected by a wire to the metallic vessel, the electrification of the electrometer is similar to that of the atmosphere. The indications of the electrometer may be recorded continuously by a photographic process and such records are of value in showing the diurnal and seasonal variations of atmospheric potential. They show that the atmosphere is practically always in a state of electrification, positive or negative; that it is generally positive in fine clear weather, and negative in wet weather; that a change from positive to negative often precedes or is accompanied by rain; that the difference of potential between earth and air increases with the height, averaging about 200 volts per metre, being greatest at those hours of the day when the temp. is increasing most quicky, and being generally greater in winter than in summer.

The origin of atmospheric electricity may be traced to the ionized state of the air, which state is produced either by radioactive elements in the earth's crust, by the action of ultra-violet light from the sun or by the emission of streams of charged particles from the sun's surface. At all events, the air is in that state, and in consequence there are contained in it positively and negatively charged particles. According to the condensation hypothesis put forward by Gerdien and others, expansion of the air due to local heating produces ascending currents of air, and, subsequently, condensation of water vapor contained in these currents. To effect this condensation, some nucleus is necessary, and the negative electrons act as nuclei to begin with, because condensation will take place upon them at a lower degree of super-saturation. Being loaded in this way, they will tend to sink in the air, and thus there is caused a separation of the two charges, positive and negative. This may go on until the difference of potential becomes so great that a disruptive discharge (flash of *lightning*) passes between oppositely electrified masses of air. This discharge tends to produce further ionization of the air, and the process goes on until the air is largely cleared of moisture by the water vapor being precipitated in the form of rain.

This hypothesis is sufficient to explain the ordinary phenomena accompanying a thunderstorm. Lightning, as is well known, is simply an electric spark, on a colossal scale passing from one mass of electrified air to another at a greatly different potential. Its passage through the air is greatly facilitated by the ionized state of the air. In its path the air is suddenly heated and expanded, and this sudden expansion causes the noise we know as *thunder*. Sheet lightning is simply the illumination of clouds by lightning flashes so far distant that the thunder produced by them is not audible, and this takes place when the observer is about 10 or 12 m. from the flash. Globe lightning—consisting of a luminous ball traveling slowly and afterwards exploding violently—has been described, but its occurrence is not clearly authenticated.

METER, ELECTRIC, an instrument for measuring the quantity of electricity used by a given installation. The appliance is placed at or near the point at which the current enters the consumer's premises, so as to assess exactly the amount of electricity supplied.

Most commercially successful meters depend either upon chemical (electrolytic) action or upon the magnetic effects of the current. The Wright meter is one of the best known of the former class. In this instrument the current, passing through a solution of nitrate of mercury, liberates metallic mercury at the katholde, and from the amount of mercury liberated the quantity of electricity consumed is determined. Similarly in the Bastian meter the current is passed through acidulated water, which is gradually decomposed, and the fall in the level of the water gives the result required.

There are many types of magnetic meters. Of these most consist essentially of a small simply designed motor, which is set in operation by the current as it passes through the meter, and moves faster or slower according to the current strength. The motion is registered on dials connected to the rotating axle of the motor. The Ferranti meter is a well-known example of this type, which is used both for alternating and continuous current work. The Aron meter contains two clocks having pendulums of high-resistance coils of wire. The oscillations of these pendulums are accelerated or retarded by the magnetic action of coils of wire placed beneath them through which the current is led. To eliminate any want of synchronism between the clocks the action is automatically reversed periodically. Like the Ferranti, this meter is used on both A.C. and D.C. circuits.

METER, GAS. See GAS METER.

METER, WATER. See WATER METER.

METHANE. Methyl hydride. CH_4. A colorless odorless gas about one half the density of air. It occurs naturally in marsh gas and in the gases from the mud volcanoes of Sicily, Italy and the Crimea. It is formed when wood or coal is dry distilled and so occurs to the extent of about 40% in coal gas. It may be prepared by heating potassium acetate with caustic soda, or sodium acetate with a mixture of equal parts of soda and lime. The gas forms an explosive mixture with air, and when mixed with chlorine and exposed to sunlight the gases combine with violence.

METHODISM, a sect founded by the Wesley brothers, Charles and John, in 1729, when studying at Christchwich College, Oxford University, England. They gathered about them a number of earnest students and formed a group for the promotion of personal religion, based upon a resolve to conduct their lives by rule and method—hence the application to them of the name 'Methodists,' at first in derision. Both brothers were ordained clergymen of

the Church of England, but they felt the need of a greater spirituality among its members, a higher moral tone, and greater care for the poor and unfortunate. Their association was called the 'Holy Club.' The members, all churchmen of the strictest class, fasted at stated seasons, cared for prisoners and the sick, and taught neglected children.

The Wesleys conducted a religious revival that had a widespread effect in both England and America. John Wesley, after visiting Georgia as a missionary, became dissatisfied with his traditional faith, and the Church of England closed its edifices against him through his affiliation with the Moravians. Following the example of George Whitehead, one of their number, the Wesleys conducted open-air meeting in England, drawing large throngs. Their success as religious revivalists led to the opening in Moorefields of the first church dedicated to the new evangelism, and other chapels soon multiplied throughout the country. Wesley withdrew from the Moravians, establishing an independent society, and in 1743 framed his celebrated 'Rules,' which became the organic law of Methodism, and part of them remain so.

The founding of a separate church was hastened by the established clergy refusing communion to the Wesleys and their converts, though John Wesley was loath to part from the Church of England to the last. He regarded the Methodists, though professed dissenters, as still belonging to the Anglican Church. The revolution in America, where he himself had brought about the establishment of Methodism by the formation of societies in 1739, called for an independent church, and American Methodism came into being concurrently with the new church's growth as a distinct sect in Great Britain. By 1791, when John Wesley died, it had also been introduced in France, Nova Scotia, Newfoundland and the West Indies, and numbered 233 circuits, 540 traveling preachers and 133,599 members.

In doctrine Wesleyan Methodism aimed originally at a spiritual revival within the Anglican Church, and its theology did not substantially differ from the Thirty Nine Articles of that church. It is more Arminian than Calvinistic as a dissenting denomination, holding that the salvation or non-salvation of every individual rests upon his own free action in his receptivity to the influence of the Holy Spirit. It teaches that the divine grace of Christ is universal, and is everybody's as Christ died for all, so is salvation for all. It recognizes baptism and communion.

The sect in Great Britain developing as Wesleyan Methodism divided into a number of seceding groups in course of time, namely, Calvinistic or Welsh Methodists, Methodist New Connection, Primitive Methodist Connection, United Methodist Free Churches, and Bible Christians. The Calvinistic Methodists, led by George Whitefield, held to the Calvinistic theology. The Methodist New Connection seceded as a protest against supreme government by the preachers. The holding of camp meetings (which the parent church disapproved) by a group of ardent members led to the formation of the Primitive Methodists, whose policy is substantially Presbyterian. The United Methodist Free Churches was organized in 1857 to unite a number of smaller bodies of Methodists who had seceded for various reasons. The Bible Christians are akin to the Primitive Methodists in adopting democratic means of disseminating the Holy Word.

In the United States the original body was the Methodist Episcopal Church, the beginning of which was formed in New York in 1766 by the holding of classes. The first church was built in Philadelphia in 1770. The Revolution interrupted the growth of the church, but after 1784, when Wesley formulated an episcopal form of government, its progress was rapid. It has been almost free from dogmatic controversy, and its doctrines conform virtually to the Wesleyan theology of Great Britain. The bishops appointed are neither prelatical nor diocesian but are viewed solely as presbyters charged with a joint duty of superintending the church.

The Methodist Protestant Church was the outgrowth of a secession from the Methodist Episcopal Church in 1820, following the refusal of the ministry of the latter to admit the laity to its law-making councils. Its policy differs from that of the parent church in that it does not recognize the episcopal office, or any general superintendent elected for life, but each annual conference elects its own chairman.

Another secession from the Methodist Episcopal Church took place in 1843, arising from an alleged laxity of the parent body in the admission of slaveholders to membership, and led to the formation of the American Wesleyan Church, which in doctrine and ordinances is Methodistic, but in policy combines the connectional and congregational principles.

The Free Methodist Church, formed in 1860, grew from a secession of members who charged that the parent body had lapsed from the simplicity and

purity of early Methodism. The African Episcopal Church was formed in 1816 to promote the spiritual improvement of the colored population. The African Methodist Episcopal Zion Church formed in 1821, originated in the withdrawal of a New York congregation of colored people from the Methodist Episcopal Church.

Minor American bodies are the Colored Methodist Episcopal Church, Congregational Methodists, Primitive Methodists (differing in no essential from the English sect), Union American Methodist Episcopal (colored) Church, the Evangelical Association and the United Brethren in Christ.

The Methodist churches have the largest religious constituency in the United States. In 1922 their membership numbered 23,253,854, including the Methodist Episcopal Church, 6,684,843; Methodist Protestant Church, 182,275; other white Methodist bodies 85,295; African Methodist Episcopal Church, 551,766; African Methodist Episcopal Zion Church, 412,328; Colored Methodist Episcopal Church, 366,315.

METHODIUS (825-85), 'Apostle of the Slavs'; with his *bro.* Cyril (*q.v.*) made it his life's work to evangelize the Slavs; labored mostly in Moravia; translated the Scriptures and liturgy into Slavonic.

METHUEN, a town of Massachusetts, in Essex co. It is on the Boston and Maine railroad, and on the Spicket river. Its industries include the manufacture of cotton goods, woolen goods and knit goods. It has a library and other public buildings. Pop. 1920, 15,189.

METHUEN (PAUL SANFORD METHUEN), 3RD BARON (1845-), Brit. soldier; joined army (1864); served on Gold Coast (1873), Ashanti (1874), and Egyptian War (1882); commanded Methuen's Horse in Bechuanaland expedition (1884-5); went to S. Africa (1899) in command of 1st Infantry Division, and defeated Boers at Belmont, Enslin, and Modder R. but was repulsed at Magersfontein (Dec. 11, 1899); was wounded and taken prisoner at Tweebosch by Delarey (1902). He held the Eastern command (1903-8), was commander-in-chief of S. African forces (1907-9), and governor of Natal (1909); was raised to the rank of field-marshal in 1911.

METHUSELAH, character in Old Testament; *f.* of Lamech; lived, according to Hebrew tradition, 969 years. See GENESIS 5^{21}.

METHVEN (56° 25′ N., 3° 35′ W.), village, Perthshire, Scotland.

METHYL ALCOHOL, wood spirit (CH_3OH); distilled from wood; B.P. 66°; intoxicating; used for making dyes and varnishes and for 'methylating' spirit.

METRE. See WEIGHTS AND MEASURES.

METRE. See PROSODY.

METRIC SYSTEM. See WEIGHTS AND MEASURES.

METRODORUS. (1) Of Lampsacus, disciple of Anaxagoras, interpreted the Homeric poems allegorically; (2) of Chios, disciple of Democritus; (3) the Epicurean (*c.* 330-277 B.C.), intimate friend of Epicurus.

METRONOME, an instrument indicating the exact speed at which a composition should be played; invented by Winkel about 1812, but patented in Paris, 1816, by Maelzel, to whom the invention is generally attributed.

METROPOLIS, a city of Illinois. Pop. 1920, 5055.

METROPOLITAN OPERA HOUSE, a permanent home of grand opera in New York City, situated on Broadway between 39th and 40th Streets. It is a huge building of the Italian Renaissance style of architecture and was opened in October, 1883, the first performance being of *Faust* in Italian under the management of Henry E. Abbey, with Italo Companini and Christine Nielsen in leading roles. It is one of the great opera houses of the world and numerous famous singers have appeared there. It was built by a corporation of wealthy men who could not obtain boxes at the Academy of Music, then the only opera house in New York City. A fire destroyed the interior in 1892, when a new company to support the institution was formed, including, among others, J. Pierpont Morgan, John Jacob Astor, Frederick, Cornelius and W. K. Vanderbilt, Perry Belmont, D. Ogden Mills and Henry Clews.

METTERNICH-WINNEBURG, CLEMENS WENZEL LOTHAR, PRINCE (1773-1859), Austrian statesman; of ancient noble Ger. family; ambassador to Berlin, 1803-5, when alliance was formed between Britain, Prussia, Russia, and Austria against France; ambassador to France, 1806; became great favorite of Napoleon, but intrigued against him; arrested at outbreak of Franco-Austrian War, 1809,

but released; Minister of Foreign Affairs, 1809, and advised peace with France; Treaty of Schönbrunn, 1809, not due to M., fatally weakened Austria, and M. set himself to recover lost territory; insisted on acceptance of Napoleon's offer for hand of Marie Louise of Austria, conducted her to Paris, 1810.

After retreat from Moscow, 1812, M. became European mediator; he resolved on reducing power of Napoleon, made treaty with Russia, 1813, but had little common interest with Allies, fearing Russia; made prince of empire, 1813; prominent at Congress of Vienna, secured domination of Austria in Ger. Confederation and at Congress of Aix-la-Chapelle, 1818.

METZ, fort. tn., Lorraine, France (49° 7′ N., 6° 10′ E.), was Roman fortress named *Divodurum*, and was known as *Meitis* in the 5th cent., when it was taken by the Franks, under whom it became cap. of Austrasia; passed to the empire in 870, and subsequently became free city of empire; invested by Charles VII. of France (1444); taken by Henry II. (1552); unsuccessfully besieged by Emperor Charles V. in 1552-3; came into possession of France by Treaty of Westphalia (1648); fortifications reconstructed by Vauban and Belleisle (1674); scene of various battles during Franco-Ger. War of 1870, in which year French under Bazaine were shut up in Metz and besieged by Germans, who eventually captured the town, which was formally annexed to Germany by Treaty of Frankfort (1871); remained a German possession till restored to France by Peace Treaty of 1919. Metz is a fortress of first class; is seat of bishopric, and has fine Gothic cathedral dating from 13th cent. Important public buildings are the town hall, library, museum. Leather goods, preserved fruit, poultry, wine. On the outbreak of the World War, Metz was the mustering place of the Ger. 5th Army; was headquarters of Ger. operations on Meuse; bombed by Allied airmen on numerous occasions. Pop 68,600.

MEUDON (48° 48′ N., 2° 14′ E.), town, Seine-et-Oise, France; glass-works. Rabelias was Curé de Meudon. Pop. 10,500.

MEURTHE - ET - MOSELLE (*c.* 48° 40° N., 6° 30′ E.), frontier department N.E. France; area, 2036 sq. miles; forests, vines, sugar-beet, hops; iron, rock salt; chief town, Nancy. Pop. 570,000.

MEUSE. (1) Dep., N.E. France (49° N., 5° 25′ E.); surface undulating; in W., Forest of Argonne; in E., plateau of Woëvre; drained by Meuse; forests; horse breeding; cereals, beet-root; hemp, iron, wine. Area, 2,408 sq. m.; pop. 277,900. (2) Or Masa, river, rises in Haute-Marne, France (48° N., 5° 30′ E.); flows through a great part of Belgium and Holland, joins the Waal, and enters the North Sea; length, 570 m., of which 400 are navigable. Figured largely in the World War. The first important clash of arms between the French and the Germans occurred in the angle between the Meuse and its trib., the Sambre. See WORLD WAR.

MEUSE - ARGONNE BATTLES, THE. (September - November, 1918). The Meuse-Argonne line was the hinge of the German retreat in Belgium and France, which if broken would lead to their defeat. The Argonne forest and the rivers Aisne and Meuse were strong natural defenses and the Germans had assembled their best divisions. After the Americans wiped out the St. Mihiel salient, they took over the lines between the Argonne and the Meuse to cooperate with General Gouraud, whose lines extended from near Rheims to the Americans at Argonne. In the September 26 attacks the French advanced 4 miles, the Americans 6, and by September 28 the American army had captured Montfaucon, Gercourt, Malancourt, Epinonville, Very and 10,000 prisoners. The French took Butte de Menil, and Navarin Farm. The German Kriemhilde line, extending from Grand Pré to Damvillers across the Meuse, was now in range of American guns. On October 4, after the capture of several towns the Americans broke through the Kriemhilde line, and won Gesnes, and on the next day Gouraud drove back the Germans on a 12 mile front, and held the whole line of the Sippe river by the 11th. The Americans gained the heights overlooking Aire Valley and captured St. Juvin on October 14. Grand Pré and Champigneulles the 16th and advanced beyond the Kriemhilde line the 18th, Bantheville and Talma Farm were won after hard fighting. On November 1, Gouraud crossed the Aisne and with Berthelot on the left gained the suburbs of Meziéres, when Armistice was declared November 11. General Pershing was at Sedan on the 6th, on the heights of the Woevre the 11th, with Metz in gun range. The French-America advance had cut the Germans chief line of communications. It is estimated that they lost 150,000 men. The Americans took 26,000 prisoners and 468 guns. The French 30,000 prisoners and 700 guns.

MEXBOROUGH (53° 30′ N., 1° 20′ W.), town, Yorkshire, England; iron

works, potteries. Pop. 16,000

MEXICAN WAR, THE. (1846-1848). The chief cause of the war was the annexation of Texas by the United States and the dispute over the western boundary. Texas declared that it was the Rio Grande to its source, then north to the 42nd degree north latitude, while Mexico decided that the Nueces River was the western boundary. The United States backed Texas, and sent General Zachary Taylor with troops to the east bank of the Rio Grande which Mexico declared to be Mexican soil. American soldiers and Mexican clashed, and Congress declared war May 9, 1846. Taylor defeated the Mexicans at Palo Alta and occupying Matamoras, forced the surrender of Monterey, September 24. General Taylor had at first only 3000 men, later about 7,000, but the Mexicans with much larger forces generally lost. With 5,000 troops Taylor defeated 20,000 Mexicans under Santa Anna Feb. 22-23 at Buena Vista, which practically ended the campaign in the north. In the south General Winfield Scott with 12,000 men after hard fighting occupied Vera Cruz and advancing on Mexico City defeated the enemy at Cerro Gordo April 18, Contreras August 20, and at San Antonio and Cherubusco. On August 24 an armistice was arranged, N. P. Trist acting for the United States in negotiations for peace. No settlement resulting, the Mexicans broke the armistice, and General Scott again took the field winning in a series of fights. Molino del Rey was stormed by General Worth September 8, Chapultepec followed and the City of Mexico was occupied September 14. Meanwhile General Kearney occupied New Mexico, August, 1846, and commander Sloat and Colonel Fremont completed the conquest of California. Peace was concluded with Mexico at Guadelupe Hidalgo, May 30, 1848, by which Mexico ceded Upper California, the Rio Grande boundary between Mexico and Texa, and New Mexico. The United States paid $15,000,000 and assumed payment of certain American claims against the Mexican government.

MEXICO. (1) (*c.* 20° N.; 99° W.), state, Mexican Republic; area, 9247 sq. miles; mountainous in S.; gold, silver, cereals, tobacco, coffee; live-stock raised. Pop. 1,000,000.

MEXICO, a city of Missouri, in Audrain co., of which it is the county seat. It is on the Wabash and other railroads, and on a tributary of the Salt River. It is the chief center trade for a large agricultural and stock raising region and its industries include the manufacture of flour, carriages and cigars. It is the seat of Hardin College for Women. Pop. 1920, 6,013.

MEXICO CITY (19° 25′ N., 99° 5′ W.), capital, Mexican Republic; founded by Aztecs, *c.* 1326; taken by Cortes, 1521, under whom new city was founded; scene of hostilities during war between Mexico and U.S., 1847; held by Americans, 1847-48; headquarters of Maximilian of Austria, emperor of Mexico, 1864-67, when it was successfully besieged by republicans under Diaz. M.C. is great railway transit and distributing center; connected by railway with Vera Cruz, El Paso, Manzanillo, Laredo, and other important towns; manufactures include textiles, clothing, tobacco, paper, firearms. Town is regularly laid out, and has many fine squares and streets; important public buildings are the national palace, containing government offices, observatory, and national museum; municipal palace, national art galleries, library and mint. There is a magnificent cathedral, built 1573-1811; great number of churches, many educational and philanthropic establishments. M. was seat of a univ., 1551-1865, and formerly contained many religious houses. Pop. 475,000.

MEXICO, federal republic in S.W. of N. America (15°-32° 30′ N., 87°-117° W.); extreme length, *c.* 2,000 m.; breadth varies from 1,000 to 130 m. (Isthmus of Tehuantepec). It is bounded on the N. by U.S. and the Gulf of Mexico, E. by the Caribbean Sea, S. by Brit. Honduras and Guatemala, and S.W. by the Pacific. The Rio Grande forms 1,136 m. of the 1,833 m. of N. boundary. The peninsula of Yucatan is one of the arms of the Bay of Campeachy, S.W. of the Gulf of Mexico; on the W. cost the long, narrow Gulf of California lies between the peninsula of Lower California (7,000-10,000 ft.) and the mainland; and S. of the Isthmus of Tehuantepec is the minor inlet of the Gulf of Tehuantepec. The soils are metamorphic, and igneous rocks with sandstone and limestone are found in the N. The greater part of the surface is plateau, along each side of which is a coastal strip of an average width of 60 m.; its border is composed of mountain ranges—the Sierra Madre range (9,000 ft.) on the W. coast, and on the E. the line of heights (16,000 ft.) that pass N. into the Rocky Mts. (sometimes spoken of as the Sierra Madre Oriental). The lowest line along the Isthmus of Tehuantepec is under 400 ft., and the low ground extends along the peninsula of Yucatan, the center of which has an average height

of C. 800 ft. The Cordilleras of Central America begin S. of the Isthmus. Between the Sierra Madre ranges stretches the great central plateau, flat, or undulating in surface, with height varying from 7,000 to 8,000 ft. There are many dormant or extinct volcanoes (Orizaba, 18,200 ft.), and in the S. a few still in action, but there have been no violent outbursts for a long time, and earthquake shocks, though frequent, are seldom severe. The coastal strips and low ground (*Tierra caliente*) are hot and unhealthy, with a maximum temp. of over 100° F., and a rainfall ranging in places up to 130 in. Along the plateau (*Tierra fria*), the maximum temp. in summer is about 88°, and in winter the minimum may fall to 30°, falls of snow, though very rare, occasionally taking place; between these is the *Tierra templada*, or intermediate zone (3,300-6,500 ft.). The line of perpetual snow is 15,000 to 16,000 ft. In the extreme N. there is the North temperate succession of seasons, but farther S. there is a rainy season from the end of May to the end of Oct. Along most of the plateau the rainfall averages 25 in. Members of the extensive fauna are the monkey, wolf, bear, muskrat, raccoon, opossum, armadillo, alligator, vampire, turtle, and pearl oyster.

The soil is fertile, and where irrigation is good two crops can be raised in one year. Hydraulic and electric power is extensively used. In the N. great herds of horses, cattle, sheep, and pigs are reared, largely for the U.S. market. Mahogany and dye-woods, wheat, corn, barley, rice, beans, bananas, sugar, molasses, coffee, cotton, henequen (agave sisal-hemp), cacao, oranges, coconuts, vanilla, mulberry, cochineal, cinchon, and rubber are obtained, and efforts are being made to introduce vines, olives, and European fruits.

Mexico is one of the richest mineral countries in the world. Coal is mined; silver and gold, which seem to have been worked from the earliest times, are still very productive; copper, iron, lead, tin, platinum, mercury, cobalt, antimony, bismuth, manganese, zinc, petroleum, salt, sulphur, amber, and onyx are obtained. The manufactures, chiefly rum, various spirits, cottons, woolens, cigars, cigarets, and tobacco, paper, leather, and earthenware, are increasing. Vera Cruz and Tampico on the Gulf of Mexico, are the chief ports. They are connected by rail with Mexico City; from this line railways northwards form junctions at various points with U.S. systems. Across the Isthmus of Tehauntepec a line (off 200 m.) connects the port of Salina Cruz on the Pacific with Coatzocoalcas on the Gulf of Mexico. The total railway mileage is about 16,000. An excellent system of national compulsory education has been organized in the last two decades. There are over 16 million inhabitants, of whom about 40 per cent. are Indians, a slightly larger proportion mulatto and half-caste Indian. Area, 768,883 sq. m. See MAP MEXICO.

The government is on the lines of the constitution of 1917. The federal republic is composed of 28 states, one federal dist., and two terrs., each state managing its own local affairs. The central government is composed of an elected president, appointed for four years, senate and house of representatives, the members of each of which are elected for two years by universal suffrage; the separate states have a governor and local congress of a similar type. There is a supreme law-court with circuit and dist. courts. Finances are in a state of chaos, owing to adoption of a gold standard and the unsettled state of the country. From the nominally universal service in the army exemption is easily obtained by the propertied classes. There is a small, fairly well equipped fleet.

History.—It is believed that the anc. inhabitants were, like those of America generally, of the Mongolian race. When Cortes and his Spaniards landed in 1519 they named the natives *Mexica* (since called Aztecs), and their cap. and country Mexico. The Aztecs possessed evidences of a civilization superior to that of Europe; it is probable that they derived their arts from the Toltecs, a kindred Amer. people who, according to the Aztec traditions, settled in Mexico in the 8th cent., and became almost extinct in the 11th cent. Cortes was at first welcomed by the Aztec emperor Montezuma, but as the Span. purpose of annexation became clear there were risings which the conquerors found great difficulty in crushing. Mexico was captured in 1521; Cortes, governor in 1522, was soon recalled, and Mendoza became vice-roy of the new Span. kingdom. Armies of Span. Jesuits aided the soldiery in building a European civilization in place of the Amer. one. Mexico remained a Span. colony till 1822, when her independence was secured, and a federal republic was established in 1824. In 1835 Texas became independent; in 1848 Upper California and New Mexico were ceded to the U.S. A European force landed in 1862 to secure redress for wrongs done to foreigners; Fr. troops entered the cap. and proclaimed an empire under Maximilian of Austria (1864). A revolution in 1867 restored the republic, Maximilian being shot. In 1910 Diaz, who

MEXICO
Scale of Miles
0 50 100 200 300 400 500
Railroads
Railroads Projected
The World Syndicate Company, Inc., N.Y.
MEXICO
GULF OF MEXICO
GULF OF CAMPECHE
GULF OF TEHUANTEPEC
PACIFIC OCEAN
REVILLAGIGEDO ISLANDS
TROPIC OF CANCER
Longitude 104° West from 100° Greenwich

was first elected in 1877, became president for the eighth time, but a rising in 1911 compelled him to resign. Under him Mexico made great economic progress. His successor, Madero, was murdered in the *coup d'etat* of Feb. 1913. In April of that year civil war broke out, and in July 1914, Huerta resigned after holding office for a year; the struggle lasted till Dec. 1915, and General Carranza was elected president in 1917. A fresh outbreak under Obregon (May 1920) led to Carranza's murder; succeeded by Adolfo de la Huerta.

General Obregon was elected president at a general election in September 1920, and was inaugurated on December 1. He at once showed a determination to govern the country with a strong hand and to readjust its finances and better its economic conditions. He sternly put down several attempted revolutions and within a year of his inauguration the country was more quiet than it had been for many years. The United States did not recognize the government on account of dispute in relation to the ownership of oil lands. By the constitution of 1917 all oil lands were to be nationalized, and this practically dispossessed from ownership of their property those Americans who had invested heavily in the rich oil fields of the State. Secretary Hughes in 1921 suggested preliminary signing of a convention which would settle these and other disputes, but this was declined by President Obregon. In May, 1923, however, by mutual agreement, a joint commission of American and Mexican representatives met in the city of Mexico and undertook to arrive at an agreement on all disputed points. An agreement was signed on Aug. 17, 1923.

The total debt of Mexico, in 1923 was about $700,000,000 and its payment was one of the chief problems faced by the administration. Various conferences were held between holders of foreign debt and Mexican representatives to provide for a method of payment.

MEXICO, FEDERAL DISTRICT OF (*c.* 19° N., 99° 25′ W.), district in S.E. of M. state; area, 463 sq. miles; includes M. City and other towns, and belongs entirely to Federal government of Mexican Republic; administered by governor and other officials nominated by national executives. Pop. 720,000.

MEXICO, GULF OF (25° N., 90° W.), inland sea, S. of N. America, along coasts of U.S. and Mexico; area, *c.* 1,716,000 sq. miles.

MEYER, GEORGE VON LENGERKE (1858-1918), ambassador and cabinet officer; *b.* Boston, Mass. He graduated from Harvard in 1879 and became a member of the Boston City Council, then of the Massachusetts Legislature, serving as speaker from 1894 to 1897. President McKinley appointed him ambassador to Italy in 1900, and he held that post till 1905, when President Roosevelt transferred him to Russia. From 1907 to 1909 he was Postmaster General and in President Taft's Cabinet (1909-13) served as Secretary of the Navy.

MEYERBEER, GIACOMO, JAKOB LIEBMANN BEER (1791-1864), Ger. composer and pianist; *b.* Berlin; studied under Clementi and Vogler; visited Italy, 1815; London, 1826; a transition composer, regarded by some as Wagner's forerunner; among his operas are *Robert le Diable, Les Huguenots, Le Prophete, L'Etoile du Nord, Dinorah, L'Africaine,* etc.

MEYNELL, ALICE CHRISTINA (*nee* Thompson) (*c.* 1853-1923), Eng. poet and essayist; is sister to Lady Butler, the battle artist. Her poems include *Preludes, Poems,* and *Later Poems,* and her essays, *The Rhythm of Life, The Children,* and *London Impressions.* She has also pub. a *Life of Ruskin* and an anthology.

MÉZIÈRES (49° 45′ N., 4° 43′ E.), capital of Ardennes, France, on Meuse; leather manufactures; taken by the Germans in 1815 and 1871. It suffered greatly during the World War. Pop. 8,500.

MÉZIÈRES, PHILIPPE DE (*c.* 1327-1405), Fr. soldier and scholar; born in Picardy; served in Italy, and in the Fr. Crusade, 1345-46; planned a religious order of Knights of the Passion; chancellor of Cyprus, 1362-72; in Paris, 1373-1405; tutor of Charles VI.

MEZZOTINT, a method of engraving invented about the middle of the 17th century. Ms. were formerly engraved on copper, but in the early part of the 19th century steel plates were introduced. The method of M. engraving was introduced in the reign of Charles I. by Prince Rupert.

MIAGAO (10° 40′ N., 122° 10′ E.), town, Iloilo, Panay, Philippine Islands; manufactures hemp. Pop. 21,000.

MIAMI, a town of Arizona, in Gila co. It is on the Arizona, Eastern Railroad, and is the center of an important copper mining region. Water power is derived from the Roosevelt Dam, which is 40 miles distant. Pop. 1920, 6,689.

MIAMI, a city of Florida, in Dade co., of which it is the county seat. I

is on the Florida East Coast Railroad, and on the Miami River, 366 miles south of Jacksonville. Miami has in recent years become one of the most popular winter resorts in the United States and has grown greatly in industrial and commercial importance. It is connected with Havana by steamers. It is the center of an extensive fruit growing country and has several fruit canneries. Pop. 1920, 29,571.

MIAMI, a city of Oklahoma, in Ottowa co. It is on the St. Louis and San Francisco, the Missouri, Oklahoma and Gulf, and the Oklahoma, Kansas, Missouri Interurban railroads. It is the center of an extensive lead and zinc mining district and has also lumber and agricultural interests. Miami was the first town in the former Indian Territory built on land set apart for town purposes. Pop. 1920, 6,802.

MIAMI AND ERIE CANAL. See CANAL.

MIAMI RIVER rises in Logan county, Ohio, at the confluence of several streams and flows southwesterly to the Ohio river at the Indiana state line, a few miles west of Cincinnati. Its length is about 200 miles and it has a number of tributaries, among them the Stillwater, the Mad River and the Whitewater. Hamilton, Dayton, and other Ohio cities are on its banks.

MIAMI UNIVERSITY, a coeducational seat of higher learning situated at Oxford, Ohio. It dates from 1809, and received both state and federal aid in its endowment. It has normal and graduate departments as well as a college of liberal arts. No tuition fees are charged and latitude is allowed in elective studies. In 1922 the university had a student roll of 1245 and a teaching staff of 83 under the presidency of Raymond M. Hughes.

MICA (Lat. *micare,* to glitter), a mineral of foliated structure, consisting of thin scales; composed of alumina silicate and containing potash, soda, lithia, and magnesia; of shining, pearly lustre; sometimes m. scales are over 20 in. in diameter and only $\frac{1}{3000}$ in. thick; it is found in Sweden, Norway, Siberia, Peru, China; varieties are biotite, lepidolite, sericite, damourite, zinnwaldite, iron m., black m. Muscovite, or potash m., is a silicate of alumina and potash, and occurs in granite, gneiss, mica-schist, and other plutonic rocks.

M. is used as window-panes in some countries, as Russia, for lamp chimneys, and stove doors, because of heat-resisting power.

MICAH, BOOK OF, in Old Testament, one of 'Minor Prophets.' M. wrote about the time of Isaiah and before the fall of Samaria in 722.

MICA-ROCKS, an important group of rock-forming minerals, entering into the composition of crystalline, sedimentary, volcanic, and plutonic rocks, such as talcose rock, granite, gneiss, etc.,

MICA-SCHIST, a very abundant mineral, and one of the crystalline schists; often contains other minerals, (*e.g.*) garnet, hornblende, beryl; is often of wavy structure, and may have alternate layers of mica and quartz, or only small shiny scales of mica.

MICHAEL, name of nine Byzantine emperors.—M. I. persecuted iconoclasts; defeated by Bulgarians, 813, and deposed.—M. II. was condemned to death for conspiracy, but seized throne, 820. —M. VII. lost wide dominions, and resigned, 1078, and retired to a monastery.—M. VIII., founder of Palæologus dynasty; conquered Constantinople, 1261; accepted papal supremacy at Council of Lyons, 1274; won victories in Greece and Italy.

MICHAEL ALEXANDROVICH (1878), Russian grand-duke, the younger brother of Czar Nicholas II. During World War he took part in Galician operations. When forced to abdicate, March 1917, the Czar transferred his rights to the Grand-duke Michael; but by a declaration March 16, the grand-duke intimated that he would only accept supreme power if the people should signify by plebiscite that it was their wish. On March 19, he was asked by Prince Lvoff and others to waive his rights, and hand over sovereign power to provisional government.

MICHAEL OBRENOVICH III. (1823-68), Prince of Serbia; organized Serbian resistance to Turkey; reformed army and civil service; assassinated.

MICHAELMAS DAY, the festival of St. Michael and All Angels, celebrated in the Western Church on Sept. 29. Michaelmas is frequently used for dating terms, etc.

MICHAEL, ST. See ST. MICHAEL.

MICHAUD, JOSEPH FRANÇOIS (1767-1839), a French historian and publicist, born at Albens, Savoy. He was educated at Bourg-en-Bresse, and went to Paris in 1791 where he became the editor of *La Quotidienne,* in which he espoused the royalist cause. He narrowly escaped death during the Reign of Terror, and after 1800 abandoned journalism and began to write books. He

published: *Histoire des croisades*, his *chef-d'oeuvre*; *Correspondance d'orient.*

MICHELANGELO, MICHAEL ANGELO (1475-1564), Ital. artist of Florentine school; *b.* Caprese, *s.* of Ludovico Buonarroti, who accepted minor duties of State to eke out his income. M. early showed aptitude for art, and in 1488 succeeded in getting himself apprenticed to Domenico Ghirlandajo (*q.v.*); secured the patronage of Lorenzo de Medici, in whose school of sculpture he studied and imbibed much of the Platonic doctrines that had been newly reintroduced into Italy. After Lorenzo's death he went to Bologna, where he executed some commissions for the Aldovrandi, but soon returned to Florence, and fell under the influence of Savonarola. On the advice of the Cardinal di San Georgio, M. journeyed to Rome, 1496. To this period belong his *Bacchus* and *Pieta*, but the troublous times in Florence had impoverished his father, and M. returned in 1501. Three years later he finished a colossal statue of *David* (now in the Academy of Fine Arts, Florence), *The Holy Family* (Uffizi Gallery), and was in the midst of several other works when he suddenly returned to Rome, 1505, where, at the request of Julius II., he commenced a magnificent monument, but as the pope grew tired of the idea, M. fled to Florence, where he continued his interrupted companion-piece to da Vinci's *Battle of Anghiari*. Reconciliation between the artist and Julius took place after the latter's capture of Bologna, 1506. M. was commissioned to cast a colossal bronze statue of the pope, and after great difficulty, as he had no knowledge of metal-casting, finished the work in 1508. He now devoted himself to painting the frescoes in the Sistine Chapel at Rome, a task which he performed practically unaided, owing to the insubordination of his assistants. The magnificent work took four and a half years to complete, and was delayed by the many difficulties placed in the artist's way by his enemies. After the death of Julius, 1513, M. continued his work on the sepulchral monument, which was again interrupted, owing to an offer from Pope Leo to execute a façade in the Church of San Lorenzo, Florence, a scheme which he abandoned owing to difficulties regarding the marble-supply. M. continued in Florence, doing little good work till 1529, when he was appointed chief military engineer to defend the city from the expelled Medici and their allies. After the fall of the city, M. resumed several unfinished commissions, including the Laurentian library and the Medici chapel. He left Florence again in 1534, and journeyed to Rome, in order to complete the Julian monument, but was ordered by Clement to add to his Sistine frescoes another picture, to replace a painting of Perugino. This task he completed in 1541, and the fresco, known as *The Last Judgment*, is one of the most magnificent pictures, both in conception and execution, that the world has ever seen.

MICHELET, JULES (1798-1874), Fr. historian; prof. of History at College Rollin, 1821-26; after Revolution, 1830; became prof. at College de France, 1838, and gave celebrated lectures; wrote *Des jesuites*, 1843; *Du pretre, de la femme et de la famille*, 1844; *Du peuple*, 1845; incurring enmity of Church and suspension of lectures; *Histoire de la Revolution*, 1847-53; monumental work, *Histoire de France*, pub. 1833-67

MICHELSON, ALBERT ABRAHAM (1852), physicist; *b.* Strelno, Poland, and came to the United States as a boy. He studied at the Naval Academy, and at Berlin, Heidelberg and Paris. From 1883 to 1892 he was successively professor of physics at the Case School of Applied Science, Cleveland, Ohio, and at Clark University, following which he was appointed to the chair of physics at the University of Chicago. He became of considerable note for his studies in optics and electricity and his investigations of the measurement and velocity of light. He invented the inferential refractometer, by which wave lengths of light were used as a measuring unit, and the echelon spectroscope, a glass-plate instrument with a varying surface area, for the study of phenomena. In 1920 he announced a new device for measuring the diameter of stars, and by its use found that of Betelgeuse (*q.v.*) to be enormous. He was awarded the Nobel prize in physics in 1907 and several highly prized medals of foreign learned societies.

MICHIGAN, state in N.E. of U.S. (44° 35′ N., 86° 25′ W.), consists of two detached portions, one a peninsula between Lake Superior and N. end of Lake Michigan, the other a larger peninsula between Lake Michigan on W. and Lake Huron, Lake Erie, and Ontario on the E.; surface of northern peninsula hilly; of the other, hilly in N. and flat in S.; drained by Muskegon, Grand, Kalamazoo, Saginaw, and many smaller streams. Cap. Lansing; largest towns, Detroit, Grand Rapids, Saginaw. The state has extensive forests, and lumbering is important industry. Agriculture is also important; produces cereals, fruits, vegetables, peppermint;

sheep and cattle raised; freshwater; fishing and large shipping trade on lakes. Minerals include iron, copper, coal, salt, gypsum, asbestos. Manufactures: motor cars, furniture, flour, beer, leather, paper; slaughtering and meat packing are important. Railway mileage, 8,925.

Michigan was first permanently settled by French in 1668, when Marquette established a Jesuit mission at Sault de Ste. Marie; and in 1701 a Fr. fur-trading station was founded at Detroit by colonists under Cadillac. Michigan remained under Fr. control until 1760-1, when it came into hands of the British, from whom it was transferred to the U.S. after the War of Amer. Independence. After forming part of N.W. Terr. and Indiana Terr. in succession, it was organized as separate terr. in 1805; temporarily occupied by British during war of 1812-15; admitted as state to Union, 1837. See MAP U. S.

Executive power is vested in governor, who holds office for two years and is assisted by lieut.-gov.; legislative authority vested in senate of 32 members and house of representatives of 100 members, elected for two years by popular vote; is divided for local administrative purposes into 83 counties, and is represented at Washington by 2 senators and 13 representatives. Education is free and obligatory; there is a state univ. at Ann Arbor, besides a number of important colleges at Detroit, Albion, etc. The univ. of Michigan is an important seat of learning; opened 1841; endowed by state, 1867; has thoroughly well-equipped departments of science, medicine, law, arts, pedagogy; fine libraries and museums; open to women from 1870. Area, excluding Great Lakes, 57,980 sq. m., of which 500 sq. m. are water; pop. 1920, 3,608,412.

MICHIGAN AGRICULTURAL COLLEGE, situated at East Lansing, is the oldest school for instruction in agriculture in the United States. It was established in 1855 by the State, which provided both land and money, and it also received a substantial federal land grant. The courses embrace agriculture, engineering, forestry, veterinary science and home economics. The college conducts a large number of farmers' institutes throughout the state during the winter months, while the U.S. Department of Agriculture cooperates with it in extension work. In 1922 there were 1484 students receiving an agricultural education under the direction of D. Friday.

MICHIGAN CITY, a city of Indiana, in Laporte co. It is on the Pere Marquette, the Chicago, Indianapolis and Louisville, the Lake Erie and Western, and the Michigan Central railroads, and on Lake Michigan. Its industries include the manufacture of lumber, the mining of iron ore and salt, cars, chairs, etc. It has an outer or refuge harbor built by the Federal government. It is the seat of the Northern Indiana State Prison, and a United States life-saving station. It has a public library. Pop. 1920, 19,457.

MICHIGAN COLLEGE OF MINES, situated in the state's mining district at Houghton, was founded in 1885 by the state, which supports it. The instruction includes mine surveying and mapping a mine in the copper or iron districts. It has a metallurgical and assay laboratory, a stamp mill and a reverberatory roasting furnace. In 1922 the college had 331 students and 25 teachers under the presidency of F. W. McNair, B.S.

MICHIGAN, LAKE, one of the Great Lakes. It is the largest body of fresh water in the United States, being wholly surrounded by American territory, unlike its companion lakes. Michigan, Indiana, Illinois and Wisconsin border it. It has an outlet through the Straits of Mackinac, which connect its waters with Lake Huron. The area is 22,450 square miles, the length 316 miles and the average width 75 miles. It is the third largest of the Great Lakes, being exceeded in size by Lakes Superior and Huron. It is practically tideless but subject to violent storms. The lake supports an important fishing industry, yielding much lake trout, whitefish and ciscoes. Chicago and Milwaukee are among the cities situated on its banks, and a number of rivers flow into it. Lumber, wheat, corn and minerals in great volume pass in transit over the lake.

MICHIGAN, UNIVERSITY OF, situated at Ann Arbor, was opened in 1841 as part of the public educational system of the state and has so remained. It is a state institution governed by a board of regents whose members are elected by popular vote. It has long ranked as among the foremost of state universities and was a pioneer in adopting coeducation. The State high schools are intimately connected with the university as preparatory institutions. The curriculum includes literature, science, engineering, architecture, medicine, surgery, law, pharmacy, homeopathy, dentistry and graduation courses. It has a noteworthy observatory, two hospitals, a training school for nurses and gymnasia for men and women. In 1922 there were 9803 students and a faculty of 714 under the presidency of M. L. Burton.

MICHMASH (32° 19′ N., 34° 52′ E.), ancient place, Palestine; the modern Mukhmas.

MICHOACAN (*c.* 19° N., 101° 30′ W.), state on Pacific coast of Mexico; area, 22,874 sq. miles; surface mountainous; rich deposits of gold and silver. Pop. 1,000,000.

MICMACS, a tribe of N. American Indians, of Algonquin stock, who formerly roamed Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland. During the colonial wars they were allies of the French. They now number about 4,000, have become civilized, but are scattered about their former territories.

MICROBE, see BACTERIOLOGY.

MICROMETER (Greek, *mikros,* 'small', *metron,* 'a measure'), an instrument for measuring small things, the name, however, being reserved for those mechanical attachments to microscope or telescope with which minute objects under the former, or diameters and distances through the latter, are gauged.

The simplest microscope micrometer consists of a glass disk marked with a network of fine lines forming squares, or with a series of equidistant lines. The disk is slipped within the eyepiece, and rests upon a diaphragm at the focal plane of the image, the lines or squares thus dividing the image into equal parts. With the aid of a stage micrometer, with lines 11,100 mm. apart, which is put in place of the object, the value of the divisions of the eyepiece micrometer can be discovered, and the dimensions of the original or any other object read off.

Much more complicated than this simple type are the micrometers used with telescopes for measuring the heavenly bodies or the apparent distances separating them. Those most commonly in use depend for the accuracy of their readings upon spider threads placed in parallel strands, and all lying in the plane of the lenses. One or both of the webs, which are placed in the focal plane of the telescope, can be adjusted by an arrangement of exceedingly finely threaded screws, so that each web touches one boundary of the distance to be measured. The heads of the screws are graduated, so that the movement of the screw, which indicates in definite proportion the separation of the webs, can be read on a Vernier scale to the smallest detail. The many varieties of micrometers which utilize spider threads or fine wires, set in parallels or intersecting, as means of measuring, are known as *Filar Micrometers,* and complicated arrangements of lights and mirrors are adopted for lighting the web during nocturnal observations.

Another common form of micrometer is known as the *Double Image Micrometer*; it is used for measuring the apparent diameter of the sun, and hence is also called a *Heliometer.* Other types include Rochon's *Double Refraction Micrometer,* utilizing the divergence of ordinary and extraordinary light rays in passing through a prism of rock crystal; the *Linear Micrometer,* a graduated scale intersected by perpendicular lines marked upon glass or mica, and placed in the field of the telescope; and the *Ring Micrometer,* Fraunhofer, a ring of steel placed in a disk of glass, and inserted in the focus of the telescope. In the two latter cases, the daily motion of the earth was employed as a distance measurer, for from it, together with the time occupied by any two objects in passing over a known chord of the ring or along the scale, and with the approximate position of one of the objects in the heavens, the differences between the right ascensions and declinations of the two objects on their relative positions could be computed.

MICRONESIA (*c.* 3° S. to 14° N., 138° to 178° E.), group of small islands, Pacific, Oceania; includes the Caroline, Gilbert, Ladrone or Marianne, Marshall, and Pelew Islands.

MICROPHONE, THE, was invented by Professor Hughes, and is now universally used as the transmitter in telephony. Hughes found that if a telephone receiver were placed in series with a resistance formed by a bad contact made of three loosely-fitting pieces of carbon, then any motion given to one of the pieces would produce a sound in the receiver.

MICROSCOPE, an optical instrument used for rendering visible objects which cannot be distinguished by unaided vision. In its *simple* form, it consists of a single lens, or of two lenses placed close together. The object under examination is placed between the lens and the principal focus. Rays from the object are refracted by the lens to a focus, and if the eye be placed there, a virtual image of the object will be seen as if proceeding from a similar but magnified object. By means of this simple microscope an object may be magnified 10 to 20 times, and in this form it is used as a reading-glass, as a magnifier to help in dissecting minute animal or vegetable tissues, and for other such simple requirements. It is conceivable, of course, that lenses of this kind could be made of higher magnifying

power, even up to 80, but this would necessitate the object being placed very close to one side of the glass and the eye equally close to the other side. Apart from this serious difficulty, there are others—(*i.e.*) *chromatic aberration* and *spherical aberration*. (See LIGHT.) Owing to the difficulty and defects mentioned, the *compound* microscope has been introduced.

The chief point of interest in the optical system of a compound microscope is in the objective, for it is here that the elimination of aberration—chromatic and spherical—has been effected by using achromatic lenses. (See LENS.) Such a combination cannot do more, however, in the way of bringing the colors together, and the remaining uncorrected colors form what is known to microscopists as the *secondary spectrum*. The task of the optician is to find other combinations of lenses which will remove this spectrum. Hitherto this was a matter of great difficulty, because the variety of refractive index in different glasses was limited. Owing to the researches of Abbe and Schott at Jena, these difficulties have been overcome, and the optician has now at his command a large variety of optical glass for different purposes. Combinations of lenses which remove the secondary spectrum and correct the spherical aberration are termed *apochromatic* objectives. There are also *semi-apochromatic* objectives in which the secondary spectrum is not entirely eliminated.

The mechanical part of a compound microscope takes many forms, but the following principal parts are found in all. The eyepiece and objective are placed at opposite ends of a brass tube, termed the *draw-tube*, and by means of a screw or toothed wheel this tube can be raised or lowered so that the objective may be brought to any convenient distance from the object under examination. The draw-tube is attached to a stand which supports a *stage* on which the object may be placed. The object is generally mounted on a slip (or *slide*) of glass, and is covered with a disk of thin glass. The stage has a slot or hole over which the slip is placed. Beneath the stage the stand also supports a *substage condenser*, which concentrates on the object examined the light reflected from a mirror. Another device used in order to increase the illumination, and to concentrate the rays of light from an object so that they can enter the objective, is to place a drop of oil between the objective and object. The oil has the same refractive index as the glass used. Microscopes of special design are used for the examination of thin sections of rocks by means of polarized light transmitted through them, and for metallurgical purposes to study the microstructure of metals.

MICROSOME, one of the minute granules embedded in protoplasm; m's seem to vary in nature and function but it is thought they are produced by the living substance and share in its activities.

MICROTOMY (Gk. *mikros*, small; *tome*, a cutting), the finer investigations of morphology have necessitated examination of exceedingly minute structures, and this can often be accomplished only by cutting exceedingly thin sections of the tissues in question. M. is the art of preparing such thin sections, sometimes only 0.015 mm. in thickness.

MIDAS (classical myth.), king of Phrygia, given, by Dionysus, the power of turning everything he touched into gold; another legend gave him ass's ears, which he tried vainly to conceal.

MIDDLE AGES, a term applied to period extending from middle of 5th cent. to closing half of 15th cent., its beginning thus coinciding with arrival of barbarian hordes in W. Europe and with beginning of dismemberment of Roman Empire. After coronation of Charlemagne, 800, the theory of the Holy Roman Empire—the emperor representing temporal, the pope spiritual, authority—became pivot round which all ideas of Middle Ages were grouped. Feudalism, necessitated by inability of European rulers to hold their own against invasions of Norsemen, was developed, but its forces were later controlled by the Papacy—(*e.g.*) the Crusades. Papacy attempted subordination of civil ecclesiastical power, and, after a long and intermittent struggle between emperors and popes, the latter triumphed. The schism of the papacy, the wars of the 14th and 15th cents., and the growth of the feeling of nationality, which had resulted in establishment of national monarchies, shook the credit of the papacy. Finally, the invention of gunpowder, the growth of commerce, etc., so strengthened the middle classes that the tottering fabric of feudalism was swept away.

MIDDLEBORO, a town of Massachusetts, in Plymouth co. It is on the New York, New Haven and Hartford Railroad, and on the Nemasket River. The town includes several villages. It is one of the oldest towns in Plymouth County and was incorporated in 1669. In it are many points of historic interest. Its industries include the manufacture, of shoes, woolen goods, lumber mills iron and marble works. Pop. 1920, 8,453.

MIDDLEBURG.—(1) (51° 30′ N., 3° 39′ E.), town, Walcheren Island, Zeeland, Holland; has former monastery; XVI.-cent town hall. Formerly commercial center. Pop. 20,000. (2) (31° 43′ S., 24° 59′ E.), town, Middleburg, Transvaal; trading center; coal-fields. Pop. 4,000. Middleburg division has pop. 65,000.

MIDDLEBURY COLLEGE, a nonsectarian, co-educational institution of higher learning, situated at Middlebury, Vermont. It was established in 1800, and in addition to collegiate courses, gives special attention to the training of high school teachers and district superintendents, which the state supports by an annual appropriation. In 1922 there were 494 students and 45 teachers under the presidency of P. D. Moody.

MIDDLESBORO, a city of Kentucky, in Bell co. It is on the Louisville and Nashville and the Southern railroads, and is near the Tennessee boundary line. The city is a favorite summer resort and has a large hospital. Its industries include the mining of coal and iron. Pop. 1920, 8,041.

MIDDLESBROUGH (54° 35′ N., 1° 14′ W.), port, Yorkshire, England; iron & steel manufactures; R.C. episcopal see; has R.C. cathedral. Pop. 1921, 133,400.

MIDDLESEX (*c.* 51° 30′ N., 0° 15′ W.), county, S. England, to N. of Thames. M. was invaded by Danes in X. and XI. cent's; battles fought at Barnet during Wars of Roses, and at Brentford during Great Civil War. M. is second smallest county of England; area, 233 sq. miles, or, including county of London, 283; bounded by Hertford, Essex, Kent, Surrey, Berkshire, Buckingham; surface flat or undulating, nowhere above 450 ft.; drained by Thames; dairy produce, market gardens, orchards. Pop. 1921, 1,253,164

MIDDLETON (53° 33′ N., 2° 12′ W.), town, Lancashire, England; textiles, chemicals. Pop. 1921, 28,309.

MIDDLETON, THOMAS (*c.* 1570-1627), Eng. dramatist; pub. *The Honest Whore,* 1604; *A Chaste Maid in Cheapside*; *The Witch* in some scenes resembles Shakespeare's *Macbeth,* and probably was written before it. *The Mayor of Quinborough* is a tragi-comedy, and contains some of his best work. His most famous dramas are *The Changeling* (his masterpiece), *The Spanish Gypsy* (a romantic comedy), and *Women beware Women.*

MIDDLETOWN, a city of Conn., in Middlesex co. It is on the New York, New Haven and Hartford Railroad, and on the Connecticut River. Its industries include the manufacture of hardware, rubber goods, pumps, hammocks, sewing machines, etc. It is the seat of several important institutions including Wesleyan University, Berkeley Divinity School, State Industrial School for Girls, and the State Insane Asylum. The public buildings include the county court-house and a public library. Pop. 1920, 13,638.

MIDDLETOWN, a city of New York, in Orange co. It is on the Erie, the New York Ontario and Western, and the Middletown and Unionville railroads. The city is the center of a large and important agricultural and truck gardening region. Its industries include the manufacture of hats, wood type, shirts, files, condensed milk, etc. It is the seat of Middletown Academy and the State Asylum for the Insane. Pop. 1920, 18,420.

MIDDLETOWN, a city of Ohio, in Butler co. It is on the Cincinnati, Hamilton and Dayton, the Cleveland, Cincinnati, Chicago and St. Louis, the Cincinnati Northern and other railroads, and on the Miami River and the Miami and Erie Canal. Its industries include the manufacture of paper, tobacco, bicycles, motorcycles, gas engines, agricultural implements. Pop. 1920, 23,594.

MIDDLETOWN, a borough of Pennsylvania, in Dauphin co. It is on the Philadelphia and Reading and the Pennsylvania railroads, and on the Susquehanna River. It is the center of an important agricultural and lumbering region and its industries include planing mills, car works, furniture factory, etc. It is the seat of an orphans' home. Pop. 1920, 5,920.

MIDHAT PASHA (1822-84), Turk. statesman; Grand Vizier, 1871; helped to organize reforming party which deposed Abdul-Aziz and Murad V., 1876.

MIDI, south of France; said to begin at Valence.

MIDIAN, N. Arab. tribe in Old Testament.

MIDLAND, a city of Pennsylvania. Pop. 1920, 5542.

MIDLOTHIAN, EDINBURGHSHIRE (55° 40′ to 56° N., 2° 50′ to 3° 40′ W.), county, Scotland, bordering S. shore of Firth of Forth; crescent-shaped; area, 367 sq. miles; chief streams, Esk and Water of Leith; several small lakes and reservoirs among hills; interesting geological structure. Since Union of

1707, M. has become important agricultural county; soil fertile; much good pasture-land. Lothians were definitely won for Scotland by defeat of Northumbrians at *Carham*, 1018; frequently invaded by Eng. forces, XIV.-XVII. cent's; many battlefields and hist. castles. Pop. 506,378.

MIDNAPORE (22° 25′ N., 87° 21′ E.), town, capital of Midnapore district, Bardwan, Bengal, India; copper and brass manufactures. Pop. 33,000.

MIDRASH (Hebrew for 'interpretation'), name given to a body of Jewish writings in the Old Testament. After the final codification of the law under Ezra exposition was still necessary. These expositions and adaptations were called Halacha and Haggada (the Halacha is the legal part of Midrashic lit., the Haggada a miscellaneous collection of material and general exposition), and were for long handed down orally, being only written down in III. cent. A.D. The Halakic M. contains the *Mekilta* ('measure') on Exodus, and the *Sifra* ('book') on Leviticus and Numbers —these go back to about the time of Christ; their exposition is in parts very similar to that of the Fourth Gospel. They are Halacha mingled with Haggada. Of the Haggadic M. there is the *Bereshith Rabbah* on Genesis and on the Megilloth, (*i.e.*) Lamentations, Canticles, Ruth, Ecclesiastes, and Esther.

MIDSHIPMAN, naval cadet in process of training.

MIDWIFE, a woman who attends other women in childbirth.

MIERES (43° 15′ N., 5° 48′ W.), town, Oviedo, Spain; coal and iron mines. Pop. 18,000.

MIFFLIN, THOMAS (1744-1800), Amer. soldier and politician; leader of Conway Cabal to substitute Gates for Washington as commander-in-chief, 1777 governor of Pennsylvania, 1790-99; put down Whisky Insurrection.

MIGNONETTE (*Reseda odorata*), a plant largely grown in gardens for its exquisitely fragrant flowers. These are zygomorphic and possess a large posterior honey disc. The plant was introduced from Egypt.

MIGRATION (Lat. *migrate*, 'to wander'), the wanderings of animals, of mankind, or even of plants, from one area to another. The most extensive, most thoroughly studied, and most purposeful of such wanderings are the annual migrations of *birds*; for almost all birds which live outside tropical regions make an autumn retreat from, and a spring advance to, their breeding quarters. But the migrations vary greatly in range, and this range in no wise depends upon the apparent capabilities of flight of the species concerned. Some movements are merely parochial, but the extent of others is almost beyond belief; the frail goldcrest braves the passage of the North Sea, a small New Zealand cuckoo (*Chalcococcyx*) crosses a 1,200-m. stretch of ocean to winter in Australia, and several migrants travel from the Arctic regions to the southern limits of America and Africa, of Australia, and even of New Zealand. During their migrations the great streams of birds keep to fairly well-defined routes, following, where possible, a coast-line, or the trend of valleys or great rivers. Usually they move during the night, and, when the weather is favorable, they pass overhead at great altitudes, sometimes of 20,000 ft., attaining on occasion a speed of 100 m. an hour.

The primary cause of bird migration appears to lie in the necessity of finding more abundant food when cold weather cuts off the supply of insects, or shortening days curtail the feeding hours. But the real journeying has become instinctive, and the causes which drive birds to warmer climes in autumn, the growth of reproductive organs which seems to offer a stimulus to the spring return to breeding haunts, are only the means of setting instinct free. No sufficient reason has ever been advanced to explain the pathless and guideless wanderings of young, untraveled birds, which cross countless miles of land and sea alone, direct to their winter haunts, or the extraordinary accuracy which lands an individual year after year in the very wood it had frequented in preceding summers.

Migration among *mammals* is a rare phenomenon, but two examples may be noted. Most remarkable are the periodic seaward movements of the small vole-like lemmings, which at uncertain times leave the highlands of Scandinavia, and march in vast hordes, by night, towards the lowlands. The European reindeer, too, though it winters on the highlands of Scandinavia, migrates in summer to the seacoast, as also does the Amer. caribou, which in warmer weather moves northwards to the shores of the Arctic Ocean.

The seasonal migrations of *fish* are determined, as in the case of other aquatic animals, by the necessity of finding a safe breeding ground.

Many *insects*, such as the larval 'army-worms' ants, locusts, a few dragon-flies, and several butterflies, 'migrate,' but the movements are generally uncertain and desultory, al-

though a few of the last-named group, such as the 'American monarch' (*Anosia plexippus*), have regular seasonal to-and-fro migrations along more or less definite courses.

The migrations of *mankind* form a subject too extensive for more than mention. In anc. times they were regulated by the necessity of finding fresh pasture for flocks; this by gradual stages led to the peopling of the habitable earth. Later migrations, such as those of the Spaniards to America, or of the Crusaders to Palestine, were dominated by motives varying from the desire for gain to religious fervor, although the former is clearly the predominant influence in most human movements. In our own day overcrowding and its accompanying evils account mainly for the extraordinary tide of migration which has set in from the older countries to newer, less-congested lands.

MIJATOVITCH, CHEDOMILLE (1842-1922), Serbian statesman and author; minister to court of St. James for three periods (1884, 1895-1900, 1902-3), to Rumania (1894), and to Turkey (1900). He acted as Serbian plenipotentiary at conclusion of peace with Rumania (1886), was again secretary for foreign affairs, and represented his country at the Hague Conference (1889). Has pub. *Rayko of Rassina, Ikoniya, The Mother of the Vezier* (novels), *A Royal Tragedy, Memoirs of a Balkan Diplomatist* (1917), etc.

MIKADO. See JAPAN.

MILAN (Ital. *Milano*). (1) Prov., N. Italy; mostly fertile plain highly canalized; articles of commerce are corn, rice, flax, silk, wine, dairy produce. Area, 1,221 sq. m.; pop. 1,833,900. (2) City, cap. of above (45° 28′ N., 9° 11′ E.), on Olona, in fertile plain; important industrial, commercial, and railway center, and chief financial city of Italy; partly enclosed by walls and entered by several gates. Notable features: magnificent Gothic cathedral of white marble (founded 1386; completed 1805-13), accommodating 40,000 people; exterior with innumerable pinnacles and statues; San Lorenzo, the oldest church; Sant' Ambrogio, Sant' Eustorgio (founded 4th cent.). Santa Maria delle Grazie (refectory with Leonardo da Vinci's *Last Supper*), San Satiro, Santa Maria della Passione, etc.; Reale, Archiepiscopal, Marino (now Municipio), Ragione (now Corn Exchange), Borromeo, and other palaces; Brera contains picture gallery (with paintings by Raphael, Luini, da Vinci, Mantegna, etc.), library and museum; Castello Sforzesco (with municipal ar collection); Museo Poldi-Pezzoli, an other museums, Ambrosian library, La Scala (famous opera-house), conserva toire of music, Arch of Peace, etc Milan is a center of silk industry an of Ital. book trade; also makes velvets woolens, cotton goods, ironware, car riages, motor cars, jewelry, glass, paper porcelain, chemicals. City was con quered by Romans (222 B.C.); sacked by Huns and Goths; passed to Longo bards, Franks, and Holy Roman Empire In 7th cent. Milan became leader of the federated Lombard cities against Fred erick Barbarossa and the Ghibellines ruled by Visconti family (dukes of Milan from 1277 to 1450; followed by the Sforzas till 1535; annexed to Spain (1540); ceded to Austria (1714); cap of kingdom of Italy established by Napoleon (1805-14); united to modern Ktaly (1859). Pop. 663,000.

MILAN OBRENOVITCH (1854 1901), king of Serbia; succeeded, 1868 obtained Turk. recognition of Serbian independence, and assumed title of king, 1882; defeated in wars, and re signed, 1869; returned, 1894, and con trolled government of his *s.*, King Alexander, who banished him, 1900.

MILAZZO, ancient *Mylae* (38° 16 N., 15° 14′ E.), seaport, Messina, Sicily wine, fruits. Pop. 16,000.

MILDEW, fungi forming white patches on plants.

MILE. See WEIGHTS AND MEASURES

MILEAGE, the allowance made to members of Congress and members of the State Legislatures for traveling expenses, at so much per mile.

MILES CITY, a city of Montana, in Custer co., of which it is the county seat It is on the Chicago, Milwaukee and St. Paul, and the Northern Pacific railroads. It is the center of an extensive cattle and farming region. Its industries include the manufacture of woolen goods and saddlery. It has several fine public buildings and a park. Pop. 1920 7,937.

MILES, NELSON APPLETON (1839), American army officer; *b.* West minster, Mass. He was in business in Boston when the Civil War broke out and entered the army as lieutenant in the 22nd Massachusetts regiment. For meritorious services he was raised to the rank of colonel in 1862; fought with distinction at Antietam, Chancellorsville the Wilderness, Spottsylvania, Court House and practically in all the battles of the army of the Potomac. He was wounded several times. At the clos

of the war he was a major-general of volunteers. He then entered the regular army as colonel, reaching the rank of major-general in 1890. He was conspicuous in many brilliant campaigns that he conducted against the Indians, from 1874 to 1886, in which latter year he rounded up the Apache chief Geronimo and put an end to his depredations. He served in the Spanish-American War, conducting the Porto Rico campaign, and in 1900 was promoted to the rank of lieutenant-general. He has several times been the storm center of controversy because of the frankness and aggressiveness with which he has criticized public officials and the conduct of military affairs. He retired from active service in Aug. 1903. Apart from magazine articles and military reports, he has published *Personal Recollections*, 1896; *Military Europe*, 1898; and *Serving the Republic*, 1911.

MILETUS, city of ancient Asia Minor; situated in Caria on W. coast near mouth of Meander; passed successively under names of Lelegis, Pityussa, and Anactoria; colonized by Cretans under prehistoric leader M. in Minoan age; birthplace of Thales, Anaximander, Timotheus, Aspasia.

MILFORD, a town of Connecticut, in New Haven co. It is on the New York, New Haven and Hartford Railroad, on Long Island Sound, and on the Wepowaug River. Its industries include the manufacture of straw hats, silverware and electrical supplies. It is a favorite summer resort and has a library, a memorial bridge, and a soldiers' monument. Pop. 1920, 10,193.

MILFORD, a town in Massachusetts, in Worcester co. It is on the New York, New Haven and Hartford, and the Boston and Albany railroads, and on the Charles River. Its industries include the manufacture of shoes, shoe thread, boot and shoe trees, cement blocks, foundry products, machinery, rubber goods, etc. In the neighborhood are important granite quarries. The public buildings include a public library and a memorial building. Milford is the trade center for a large farming and manufacturing community. Pop. 1920, 13,471.

MILITARY ACADEMY, THE UNITED STATES. Located at West Point, New York, for the training of young men for the military service of the United States, in theory and practice. Founded January 20, 1778. The idea of a military school originated with General Henry Knox, chief of artillery, in May, 1776, and in October, Congress appointed a commission to prepare a plan. Fire destroyed the buildings in 1796. In 1802 the academy was opened with 10 students present. Each senator, congressional district and territory, including Porto Rico, Alaska, and Hawaii is entitled to appoint 2 cadets. There are 82 cadets-at-large appointed, 80 by the president, and 2 by the vice-president. Appointments must be made 1 year in advance of date of admission by the Secretary of War upon the nominations of senators and representatives. Candidates age, 17 to 22. The course is four years. By Act of May, 1916 the president may appoint enlisted men, or National Guards; not more than 180 at any time. Age, 19 to 22. The 12 departments of the academy include civil and military tactics, natural, and English history, chemistry, mathematics, languages, mineralogy, geology, law, drawing, etc. The cadet corps is under a commander, and two battalion officers of the U.S.A.

Since 1902 over $7,000,000 has been expended in buildings. Superintendent General Frederick W. Sladen, U.S.A. Students 1,154. (1922) Academy military staff 15. From 1902 to 1922, graduates, 6,959.

MILITARY COURTS. The United States army has a number of tribunals established to maintain military discipline. The Summary Court is most familiar to offenders against army regulations, being in frequent operation for passing on the multitude of minor infractions that can be disposed of by an inferior court. It is composed of a single officer of a regiment, fort, camp or post, acting for the commanding officer, but has very limited authority. Officers cannot be tried before it, its punishing power is restricted, and its decisions are subject to review. The tribunals best known to the public are the Courts Martial, general, garrison or regimental, and Courts of Inquiry. Courts martial have a large jurisdiction, extending over all persons receiving military pay, including camp retainers in war time, and are specially held to try officers, cadets and candidates for commission, who cannot be tried by any other tribunal, as well as privates charged with serious offenses. A general court marshal is composed of from five to fifteen officers, one of them presiding, and a judge advocate, who acts as government prosecutor of the accused. A garrison court martial has three officers and a judge advocate, and is chiefly used to try non-commissioned officers who exercise their privilege of objecting to trial before a summary court. The regimental court is similarly constituted, and, as its name implies, is a regimental institu-

tion, an offender being tried by officers of his own regiment. Courts of inquiry investigate the conduct of officers and soldiers assigned to certain duties, especially financial or purchasing, when their transactions come under question. Such a court is held at the demand of an implicated officer or soldier, but it inquires into charges and reports thereon without giving any findings unless ordered to do so. In war time or periods of disorder there are also military commissions for trying persons who violate military measures, such as martial law, and general laws of war.

MILITARY EDUCATION. For instructing cadets the educational system of the United States army provided the Military Academy at West Point, N.Y. and for enlisted men a number of post schools. For higher branches of military science there are garrison schools for instructing officers in their ordinary duties at each garrison post and the Army Service Schools. There are also numerous private military establishments as well as courses in military science forming part of the curriculum of various colleges and universities. At West Point the cadets between 17 and 22 years of age, qualify as army officers, and after graduation receive commissions as second lieutenants. In the post schools, enlisted men are instructed in primary and higher subjects, including technical branches like radio, wireless telegraphy and field telephony, but the attendance is voluntary. The Army Service Schools augment the training acquired by officers in the garrison schools. At the School of the Line, Fort Leavenworth, Kan., they learn military art, military engineering and military law. The Army Staff College, at the same location, teaches them the work of the General Staff, supply officers, military historical research, and modern languages; and also prepares them for the Army War College at Washington, D.C., where officers of superior rank are trained in the duties of the higher command. Instruction in artillery is conducted at the Coast Artillery School, Fort Monroe, Va.; military engineering at the Field Engineer School, Washington Barracks, D.C. Other essential branches of army education are taught at the Army Signal School, Fort Leavenworth; Mounted Service School, Fort Riley, Kan.; Army Medical School, Washington, D.C.; Schools of Fire for Field Artillery and of Musketry at Fort Sill, Oklahoma; the Ordnance School at Sandy Hook, N.Y., where mathematics, chemistry, ballistics, ordnance design, tests and inspections are taught; and at Signal Corps Aviation Schools. At Washington Barracks there are also schools for training enlisted men as bakers, cooks or mess sergeants.

MILITARY INSIGNIA. Each branch of the United States Army has a distinctive color in the facings of the uniforms. The Staff Corps have dark blue facings; Engineers, scarlet piped with white; Signal Corps, orange piped with white; Ordnance Departments, black piped with scarlet; Medical Corps, maroon; Quartermaster Corps, buff; cavalry, yellow; artillery, scarlet; infantry, light blue. The full dress coat of officers and men is dark blue, while their service coat has an olive drab color. The rank of officers is shown on the sleeves of their full-dress coats, and on the shoulders of their service coats. The insignia is as follows: Major-General, two silver stars above a band of gold encircling the cuff and two like stars on the shoulder; brigadier-general, one silver star above the cuff band of gold and one star on the shoulder; colonel, five strands of gold wire lace arranged to form a knot from the cuff to just below the elbow, and one silver eagle on the shoulder; lieutenant-colonel, four strands of gold lace from cuff to elbow and a silver leaf on the shoulder; major, three strands of gold lace on the sleeve and a gold leaf on the shoulder; captain, two strands of gold lace on sleeve and two silver bars on shoulder; lieutenant, one gold strand (sleeve) and one shoulder bar of silver; second lieutenant, one gold bar on shoulder of dress uniform, and no insignia on service dress. Non-commissioned officers indicate their rank by chevrons on the sleeves, worn point upward between the elbow and shoulder. Sergeants wear three stripes, corporals two, and lance corporals one stripe.

MILITARY STRENGTH, REDUCTION OF. See ARMY, UNITED STATES.

MILITIA. See ARMY, U.S.

MILITIA, NAVAL. The naval militia of the United States is a state reserve force that had its origin in a naval militia organization formed in Massachusetts in 1890. Similar bodies were established later by other seacoast as well as lake states. The training of the naval militia, who are supplemental to the national naval reserve, is undertaken by the State with the help of small naval vessels (more than thirty) lent by the Navy for the purposes of drill and exercise. Such vessels are commanded by a naval officer and manned by a naval crew. Some of them take the militia on short cruises each year. During practice cruises the militia officers and men have charge of the vessel. Their training is under the direction of the

Navy Department, though the expense is defrayed by the States in formity with the original purpose of the naval militia, which was the defense of coast, lake and harbor waters in time of war. The naval militia is organized in the District of Columbia and twenty two states, namely California, Connecticut, Florida, Illinois, Indiana, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, Washington and Wisconsin. It is normally a small body, numbering under 10,000 officers and men.

MILK, the fluid secreted by the mammary glands of female mammals. It forms a complete food for the young, and is almost unique among animal foods in containing representatives of all three nutritive constituents—proteids, carbohydrates and fat—in addition to water and mineral matter. It consists of an opalescent aqueous solution of casein, other proteins, milk sugar and mineral matter containing fat in the form of an emulsion. The proportions in which the constituents exist vary with different animals and, to some extent, with different individuals of the same species. Comparing the average composition of human milk with that from the cow, the goat, the mare and the ass, it is found that human milk is lower in protein and mineral matter and higher in sugar than any of the others. Human milk, cow's milk and goat's milk contain approximately the same percentage of fat (about 3.5%) while milk from the mare and the ass contains very much less (about 1%). It seems that the faster the young animal grows, the richer is the mother's milk in protein and mineral matter. For instance, the young rabbit doubles its weight in seven days, and the mother's milk contains 10% protein and 2.5% mineral matter; whereas the human baby takes 180 days to double its weight, and human milk contains only 1.0% protein and 0.2% ash. These figures are significant because protein is necessary for building tissue and mineral matter for the growth of bone. *Cow's milk* is of chief importance from the economic standpoint. It contains from 12 to 14% solid matter, from 3 to 4% protein, from 3½ to 5% fat, from 4 to 5% milk sugar, and about 0.7% mineral matter. Although milk is a fluid outside the body, it is acted upon by rennin in the stomach and becomes a solid clot. For this reason, many people find milk difficult to digest. The addition of citrate of soda prevents milk from clotting, and by mixing it with seltzer water the clot is rendered friable and easy of digestion. Thickening the milk with cornflour, or eating it with some other solid food also renders it more easily digestible, because the particles of food form a spongy clot instead of a tough, leathery mass.

MILK, CASEIN OF. See CASEIN OF MILK.

MILK FEVER, the name given to the febrile state sometimes occurring two or three days after childbirth, frequently brought about by a chill. It can generally be subdued in a few hours by the use of cooling saline draughts and by encouraging the free flow of milk.

MILKING MACHINE, an apparatus for milking cows mechanically, without direct use of the hands. Various machines are on the market, differing somewhat in details, but all worked on similar principles. Reduced to its simplest terms, the machine consists of a suction pump, having attached to it rubber tubes which are connected with the cow's teats. The pump creates a vacuum and so draws the milk from the udder and delivers it into a small tank or pail. The better type of machine is also fitted with an air filter, in order to lessen the danger of contamination. With these machines, two or even more cows can be milked at one time, and if used carefully and intelligently they give good results. With cows which have long been accustomed to being milked by hand, difficulty is sometimes encountered, but with young cows results are perfectly satisfactory, and it is stated that in some cases cows which are hard to milk because of short teats, or for some other reason, respond more readily with machine milking than with hand milking. It is important, of course, to keep every part of the machine scrupulously clean, and to immerse the rubber tubes and teat cups in a 10 per cent salt solution when not in use. With ordinary care, milk in which bacteria are reduced to a minimum can be produced.

MILKWORT, plant of order Polygalaceæ; Common M. (*Polygala vulgaris*) grows in pasture, has blue, pink, or white flowers growing in a raceme; a tonic medicinally.

MILKY WAY, a dimly luminous zone encompassing the heavens as a great circle; is vaguely terminated, of irregular breadth, and has numerous offshoots and appendages; commonly known as the Galaxy.

MILL, apparatus for grinding substances like corn; simplest form, two stones, one hollowed; later, two heavy circular stones; discarded for modern machinery, *c.* 1790.

MILL, JAMES (1773-1836), Scot. philosopher; *b.* Forfarshire; ed. Edinburgh; held important post under East India Co.; a political writer, whose 'philosophic radicalism' led to demand for security for good government through extension of franchise (Reform Bill).

MILL, JOHN STUART (1806-73), philosopher and political economist; *b.* London; *s.* of James Mill (*q.v.*), who directed his education; served East India Co., 1823-58; chief conductor, *Westminster Review*, 1835-40; M.P., 1865; author of *Logic*, 1843; *Principles of Political Economy*, 1848; *Liberty*, 1859; *Representative Government*, 1860; *Utilitarianism*, 1863; *Examination of Hamilton's Philosophy*, 1865.

MILLAIS, SIR JOHN EVERETT (1829-96), Eng. painter; *b.* Southampton; studied at the Academy schools and at seventeen exhibited his first picture. With *The Gambler's Wife* of 1869 he broke into a more original style, and his later pictures are remarkable for their technical qualities. The finest specimen of his landscapes is *Chill October*, and as a figure-piece *The North-West Passage* is well known. He was elected Pres. of the Royal Academy, 1896.

MILLAU (44° 7′ N., 3° 6′ E.), town, ancient *Aemilianum*, on Tarn, Aveyron, France; kid gloves. Pop. 19,000.

MILLENNIUM (Lat. 'a thousand years'), the name given to the Christian belief that Christ would return to reign for a thousand years (used more loosely, besides, to express the coming of the Kingdom of God on earth when all evil will be done away). The belief is part of early Christian eschatology, but it was for ever, not only for a thousand years, that Christ was expected to reign. In *Revelation* 20, however, Christ reigns for a thousand years before the resurrection of the dead and the last judgment. These millennarial ideas had great hold in the early Church. But a reaction against them came, especially in the East. Speculations as to an impending reign of Christ and his saints on earth have appeared at various times.

MILLER, HENRY (1860), actor and theatrical manager; *b.* London, Eng. His parents emigrated to Toronto when he was eleven years old, and there he made his first stage appearance in 1879. The next year he went to New York and played Shakesperian roles with Adelaide Neilson. His early successes included the leading roles in *Sweet Lavender*, *Shenandoah* and *the Lady of Lyons*. He appeared as a star in 1897, toured America and visited England in 1909. Under his own management he produced *Daddy Long-Legs* in 1915, and since the appeared in a succession of popula plays. A theatre in New York wa named after him.

MILLER, HUGH (1802-56), Sco geologist; *b.* Cromarty; editor of *Witnes* 1839, in which paper appeared h famous articles on 'The Old Red Sand stone,' 1840; wrote *My Schools an Schoolmasters*, 1852; committed suicid at Portobello.

MILLER, JOAQUIN (1841-1913 author and poet; *b.* Wabash distric Indiana; *d.* San Francisco. His re name was Cincinnatus Heine Mille He became a Californian gold mine fought in Nicaragua, lived with th Indians of the Pacific Coast, studied la edited an Oregon newspaper, and 1870 became a county judge in Orego Later he visited England, where h *Songs of the Sierras*, 1871, made him note. Thereafter he engaged in journa ism in Washington, D.C. and Oaklan Cal. His other works include *Songs the Sunlands*; *Songs of Italy*; and *Son of the Mexican Seas*.

MILLER, WARNER (1838-1918), R publican political leader and manufa turer; *b.* Hannibal, N.Y. After takin part in the Civil War as a cavalry office he established a paper factory at Her imer, N.Y., and served in the New Yo legislature, meantime becoming a leadi force in up-state politics. He was member of Congress from 1879 to 188 when he was elected U.S. Senator fill the unexpired term of Thomas Platt (*q.v.*), who resigned with Rosc Conkling (*q.v.*). In 1888 he was defeat for election as governor of New Yor

MILLER, WILLIAM (1782-1849), r ligious leader and founder of the Seco Adventists. After fighting in the W of 1812, he became deeply religious a began prophesying the second comi of Christ. In 1818 he predicted Chris coming in 1843 and lectured throughо the country to large and interest audiences, speaking eloquently in ant ipation of the event. Christ was reign for a thousand years, and Mille numerous followers awaited the seco coming with excitement. When 18 came and went without the result acknowledged his error and set t event for Oct. 22, 1844. Despite t second failure of his prophesy, many his disciples remained faithful to him his death.

MILLERAND, ALEXANDRE (185 president of the Fr. Republic; *b.* Pa where he was educated. Studied la and since 1881 has been an advoc at the Paris Court of Appeal. For so

years he edited *La Petite Republique*, and later *La Lanterne*, having in the latter MM. Briand and Viviani as collaborators. Eventually he broke away from the unified Socialist group, whose leader was M. Jaurès, and became an independent Socialist. In the Chamber he was a recognized authority on social reform, and his appointment to the Ministry of Commerce, 1899, gave him a wide field for dealing with such questions as women's work, old age pensions, etc. In 1909 he became minister of public works, and in 1912 minister of war, an office he resumed on the outbreak of the World War, and held till the resignation of the Viviani ministry, Nov. 1915. Subsequently he devoted himself to relief work until the Armistice, when he was appointed commissioner-general of the republic at Strasbourg and administrator of Alsace-Lorraine. In Jan. 1920 he succeeded M. Clemenceau as prime minister, and in Sept. of the same year succeeded Deschanel as president of the republic.

MILLET includes two species of gramineous plant, *Sorghum vulgare*, and *Panicum miliaceum*, both cultivated in Mediterranean countries, India, etc., as cereals.

MILLET, FRANCIS DAVIS (1846-1912), artist and war correspondent; *b.* Mattapoisett, Mass. He learned to draw and paint in Antwerp, London and Paris after graduating from Harvard. In the Russo-Turkish war of 1877-8 he wrote and sketched as correspondent for the New York *Herald*, London *Daily News* and the London *Graphic*. In the Philippines, 1898, he described the fighting there for the London *Times* and *Harper's Weekly*. He was chiefly notable for his mural paintings, to which he gave much study in his later years. Examples of his work appear in the Baltimore Custom House, Cleveland Post-Office, Minnesota State Capitol, the Supreme Court, Madison, Wis. and the County court-houses at Newark and Jersey City, N.J. He took an active part in founding the American Academy at Rome. He met his death in the sinking of the Titanic on April 15, 1912.

MILLET, JEAN FRANÇOIS (1814-75), Fr. painter; studied in Paris, executed signboards in his early struggles, settled at Barbizon, and there painted the rustic life of France as no other has done. His most famous picture is *The Angelus*.

MILLS, ALBERT LEOPOLD (1854-1916), brigadier-general; *b.* New York City. He graduated from the U.S. Military Academy in 1879, did frontier duty, fought the Indians, served in the Spanish-American War of 1898 (earning medal from Congress) and became superintendent of West Point. After service in the Philippines he commanded the Department of the Gulf and before retiring in 1914 served briefly as president of the Army War College.

MILLS COLLEGE, a seat of learning for women situated in Oakland, Cal. It was founded in 1871 as a seminary and chartered as a college in 1885. The curriculum includes home economics and physical training. In 1922 the students numbered 500 and the faculty 65 under the presidency of A. H. Reinhardt.

MILLS, ROGER QUARLES (1832-1911), U.S. Senator and Confederate officer; *b.* Todd County, Kentucky. He early removed to Texas, where he practiced law and took a distinctive part in the Civil War on the Confederate side. He represented Texas as a Democrat in the U.S. House of Representatives from 1873 to 1892 and in the Senate to 1899.

MILLSAPS COLLEGE, situated in Jackson, Mississippi, was founded in 1892 by the Methodist Episcopal Church, South. It had 389 students and 15 teachers in 1922 under the direction of A. F. Watkins.

MILLVALE, a borough of Pennsylvania, in Allegheny co. It is on the Pennsylvania and the Baltimore and Ohio railroads, and on the Allegheny River. Its industries include the manufacture of iron products, saws, stone and lumber. Pop. 1920, 8,031.

MILLVILLE, a city of New Jersey, in Cumberland co. It is on the Pennsylvania Railroad and the Maurice River. Its industries include the manufacture of glass bottles, glassware, cotton goods, iron goods, etc. It has a high school and a public library. Pop. 1920, 14,691.

MILMAN, HENRY HART (1791-1868), Eng. historian; dean of St. Paul's; chief works, *History of Christianity*, 1840, and its continuation, *History of Latin Christianity*, 1855; important as leader of Latitudinarian movement.

MILNE, SIR GEORGE FRANCIS (1866), Brit. soldier; entered army, 1885; brigadier-general commanding 4th Divisional Artillery, 1913-14. During the World War he acted as chief staff officer, headquarters staff, 2nd Army, subsequently commanding a division, and afterwards a corps. In June 1916 he succeeded Sir Bryan Mahon in command of Brit. forces at Salonica, and held that post till the close of the war.

MILNE-EDWARDS, HENRI (1800-85), Fr. zoologist, student of invertebrates, and of comparative anatomy and physiology.

MILNER, ALFRED, 1ST VISCOUNT (1854), Eng. statesman and administrator; under-secretary of finance in Egypt, 1889-92; wrote *England in Egypt*, 14th ed. 1907; chairman of Board of Inland Revenue, 1892-7; governor of Cape of Good Hope, 1897-1901; high commissioner for S. Africa, 1897-1905; opposed Kruger's treatment of Uitlanders in Transvaal; at the conference of Bloemfontein, 1899, insisted on enfranchisement of British; governor of the Transvaal and Orange River Colony, 1901-5; was cr. baron 1901 on short visit to England, where before and during the S. African War he raised greatest enthusiasm among imperialists on the one hand and violent opposition from Liberal left; viscount, 1902; showed good qualities as administrator, settling country after war and reorganizing agricultural and other departments, but roused storm at home by consenting to importation of Chin. coolies for work in mines, 1904; retired 1905, but re-entered politics as member of the War Cabinet without portfolio, 1916; conducted mission to Russia, 1917; secretary of state for war, 1918; secretary of state for colonies, 1919. Head of Milner mission to Egypt, 1920 which resulted in the establishment of the independent rule of that country. See EGYPT.

MILOGRAM. See WEIGHTS AND MEASURES.

MILOMETER. See WEIGHTS AND MEASURES.

MILOSH OBRENOVICH I. (1780-1860), prince of Serbia; founder of house of Obrenovich; rose from herdsman to be ruler of his district; opposed Turk. occupation, obtained home rule, and was elected prince, 1817; recognized by Turkey as hereditary ruler, 1829-30.

MILTIADES (d. *c.* 488 B.C.), Athenian general; ruler of Chersonese; fled to Athens on approach of Persians, but later advised marching to Marathon where he defeated Persians, 490.

MILTON, a borough of Pennsylvania, in Northumberland co. It is on the Philadelphia and Reading and the Pennsylvania railroads, and on the west bank of the Susquehanna River. Its industries include rolling mills, car shops, knitting factory, saw mills, tool factories, and machine factories. Pop. 1920, 8,638.

MILTON, a city of Massachusetts, in Norfolk co. It is on the New York, New Haven and Hartford Railroad, and on the Neponset River, 7 miles S. of Boston, of which it is a suburb. In the vicinity are large stone quarries. The town has an academy and a meteorology observatory. Pop. 1920, 9,382.

MILTON COLLEGE, a coeducational seat of learning situated in Milton, Wisconsin, chartered in 1867 as an academy. It has a School of Music as well as a collegiate department. There were 182 students and 16 teachers in 1922 headed by A. E. Whitford.

MILTON, JOHN (1608-74), Eng. poet; *b.* Bread Street, Cheapside, London; *s.* of a scrivener; ed. St. Paul's School, 1620-25; Christ's Coll., Cambridge (from which he was rusticated for insubordination), 1625-32; M.A. 1632; lived and studied at Horton, Bucks, 1632-38; went to Italy, 1638, and remained for 2 years, and while there visited Galileo; returning, he resided in St. Bride's Churchyard, Fleet Street, and then in Aldersgate Street, where he acted as tutor to his nephews Edward and John Phillips; *m.* Mary Powell, of Royalist family, 1643; she was only 17 and after a few weeks she returned to her parents. She returned, 1645, and, mother of three daughters, *d.* the year in which M. became blind, 1652. M.'s *Tenure of Kings and Magistrates*, 1649, brought him into prominence, and he was app. Sec. of Foreign Tongues to the Commonwealth; *m.* Catherine Woodcock, *dau.* of a Puritan officer, 1656; she died in childbirth, 1658. Catherine is the 'late espoused saint' of his great sonnet. When the Restoration was approaching, M. wrote *The Ready and Easy Way to Establish a Free Commonwealth*, advocating republic without established Church. Arrested, 1660, he was released possibly through Marvell's influence; his *Eikonoklastes* and *Defensio* were burnt by the common hangman. Disappointed in his dau's, who seem to have neglected him, he *m.* Elizabeth Minshull, a lady of 25, in 1663. He *d.* and was buried at St. Gile's, Cripplegate, Bucks.

His early poems, (*e.g.*) *Ode on the Nativity*, 1629, show Spenserian influence, but the new Miltonic music is there. *L'Allegro* and *Il Penseroso* show his thorough command of measure. *Comus*, 1634, a masque, is full of beautiful poetry, but only in parts does it show the great organ music of *Paradise Lost*. *Lycidas*, an elegy on the death of Edward King, who was drowned in the Irish Sea, is one of the greatest elegies ever written in any tongue.

His greatest poem is the epic *Paradise Lost*, which deals with the Fall of Man,

while *Paradise Regained* treats of Man's Redemption. The latter is less great than the former. In *Paradise Lost* can be seen all that is best in his poetry—the beautiful word music, the gorgeous imagery, the magnificent pageantry. The vehicle of both poems is blank verse.

MILWAUKEE, a city of Wisconsin, in Milwaukee co., of which it is the county seat. It is the largest city in the State in population and industrial importance. It is on many railroads, and on the west end of Lake Michigan, at the mouth of the Milwaukee River, 85 miles N.W. of Chicago. The city has a total area of 22 sq. miles. Through the principal part extends the Milwaukee River, which, with the Menominee and Kinnickinnic rivers divides the city into three sections known respectively as the East, West, and South sides. These rivers are all navigable for the largest lake vessels. On the west side of the Milwaukee River the city has an elevation of 125 feet, and between the lake and the river, 80 feet. Here are wide and beautiful streets and the residential thoroughfares are shaded with large trees. Milwaukee is an important industrial center, and the manufacture of iron and steel products is the most important industry. Of this there are over 100 establishments. It has also immense flour mills, some of which have a capacity of 10,000 barrels daily. Some of the enormous grain elevators have a capacity of 5,500,000 bushels. The packing of pork is also carried on on a large scale. Other industries include the manufacture of leather goods, machinery, iron and steel goods, clothing, stoves, furnaces, etc. The city has over 3,600 large manufacturing establishments. The city has many handsome public buildings. These include a county court-house, a Federal building, public library, museum building, Layton Art Gallery, and the Northwestern Soldiers' National Home. In addition to these there are many hospitals and similar institutions and many charitable organizations. The city is the seat of a Protestant Episcopal bishop and of a Roman Catholic archbishop. There are many notable church buildings, including the Roman Catholic Cathedral of St. John. The school system is excellent. There were enrolled over 50,000 pupils and there are ten high schools. The institutions of higher education include the State Normal School, Milwaukee College for Women, Marquette College, Roman Catholic Seminary of St. Francis de Sales, Convent of Notre Dame and Concordia College. Milwaukee was founded in 1835 and received a city charter in 1846. The first settlement on the site was made by Juneau, a French fur trader, who settled here in 1817 when the place was a site of an Indian village. Its growth has been very rapid, and it is notable for its large German population, which makes up over half of the population. Pop. 1920, 457,147.

MIMEOGRAPH. An apparatus for obtaining a large number of copies of a manuscript or typescript. It was invented by Thos. A. Edison, the application for the original patent having been made in 1878. The process depends, fundamentally, on the preparation of a stencil, representing the original copy, which is then used in conjunction with an inked roller for the production of more copies. In the original equipment, the copy was made on a specially prepared tissue paper by means of a steel stylus. The paper was placed on a baseboard of steel, covered with fine, intersecting corrugations which produced a mass of sharp points. In traveling over the paper, the stylus pressed down on these points, thus causing a series of minute punctures in the paper. When the writing was complete, the paper was stretched tightly in a frame, and then, by placing beneath it a sheet of white paper and supporting it on a smooth surface, an impression of the stencil was obtained by passing an inked roller over its surface. As long as the stencil remained in a good condition, an indefinite number of copies could be obtained. The modern machines are very similar in principle, but provision is made for the production of stencils with the typewriter.

MIMICRY, the resemblance in shape, coloration, or both, between two species not closely allied, with the object of protecting one or both. The phenomenon is best known among butterflies, where it has been observed that in an area where certain distasteful or protected species occur there are also found species lacking the protective qualities, but resembling the distasteful species in shape and color.

In groups other than butterflies resemblances occur, the model generally being some species of Hymenoptera, characterized by its powers of defense, such as a sting, while the mimics may belong to groups as different as flies and moths. Thus bumble-bees are closely imitated by the two-winged *Volucella*, as well as by the bee hawk-moths; ichneumons by the Diptera *Conops* and *Ceria*.

MINARET. See under ARCHITECTURE

MINAS GERAES (*c.* 18° 50′ S., 46°

W.), one of interior states, Brazil; first settled by Portuguese in XV. cent.; threw off Portug. yoke with rest of Brazil in 1889, and became member of Brazilian republic. M. G. has area 221,951 sq. miles; surface consists of plateau in W., elsewhere mountainous, reaching height of *c.* 5900 ft.; watered by São Francisco, Grande, Parana; capital, Minas (Bello Horizonte). State has valuable mineral deposits and many mines; gold, diamonds, iron, lead. Coffee and sugar-cane are cultivated and cattle raised. Pop. 1920, 5,788,837.

MINBU (20° 10′ N., 95° E.), town, capital of Minbu district, Upper Burma, on Irrawadi. Pop. 6000; district, 235,000; division, 1,100,000.

MIND. See PSYCHOLOGY.

MIND, SUBCONSCIOUS. See AUTO-SUGGESTION.

MINDANAO, second largest island of Philippines (7° 35′ N., 124° 10′ E.); surface very mountainous, with many active and extinct volcanoes; drained by the Rio Grande and other streams; numerous lakes; interior densely forested; copper, coal, platinum; cattle and horse raising; rice, coffee, hemp, sugar-cane, tobacco. Area, 36,906 sq. m.; pop. *c.* 560,000.

MINDEN, a city of Louisiana, in Webster parish, of which it is the parish seat. It is on the Louisiana and Arkansas Railroad and is the center of an important cotton growing and sugar raising region. Its other industries include saw mills, cottonseed oil mills, and cotton compresses. Pop. 1920, 6,105

MINDORO, one of the Philippine Islands, lying S. of Luzon, 110 m. long, 56 m. broad, and covering an area of about 4050 sq. m. The highest point of the island is Mt. Halcon, 8868 ft. Calapan, in the N.E., is the capital. Rice, cocoa, tobacco, hemp, cotton, etc., are raised, and various kinds of timber are exported. Coal and sulphur are being worked. Pop. about 30,000.

MINERAL.—Any homogeneous inorganic substance, whether element or compound, forming part of the earth's crust, is termed a m. Two m's only—water and mercury—are liquid at the ordinary temperature and pressure. M's occur as deposits of virgin or unpolluted m., such as coal, gold, lead, or far more commonly as deposits of m. ores—m's associated with other substances, called *gangue.* M. ore deposits are generally divided into three kinds—metalliferous, non - metalliferous, and earthy. Metalliferous ores are supposed to have two origins—igneous outburst and accumulations of m. particles by water. In the case of igneous ores quantities of molten rock would be forced through other rock in a state of solidity. No doubt certain metals (*e.g.*) iron, aluminum, etc., were carried in vapor to pockets or crevices, where owing to the lowered temperature, they solidified, all taking place at vast depths below the earth's surface.

Non - metalliferous deposits afford stones used and quarried for building purposes, as the granites and syenites which occur in intrusive masses. Other m. deposits—the earthy—no doubt would be precipitated from solution (*e.g.*) bog-ore, which is rich in iron but mixed with sand and clay. If buried at great depth below the surface, bog ore becomes changed to red hæmatite (*q.v.*). Non - metalliferous deposits from solution are the salines, (*e.g.*) rock-salt gypsum. Some m. deposits are the result of vegetation existing on the earth ages ago—coal, peat, etc., while others may be due to metamorphic action on existing deposits, as in graphite.

MINERALOGY, the science of m's differentiating and classifying them according to their properties. Mineralogy includes the study of all inorganic substances, and while geology (*q.v.*) studies m's in their massive state mineralogy deals with them as separate substances and individual components of the earth's crust.

The history of mineralogy is of little importance. Beautiful m's were used and described by the ancients. No serious attempt at a study of mineralogy as a science was made until the XVI cent., when George Agricola took it up. Wallerius and Cronstedt commenced a classification of m's, and their work was continued by Werner. Hauy investigated crystallography. (*q.v.*), and the great advances in chemical knowledge soon obtained mineralogy a secure footing as a science.

Minerals are classified according to their chemical composition and physical properties. Of these the chief headings are: specific gravity and action of moderate and blowpipe heat upon them; the crystalline forms, measurements of angles of crystals, and their cleavage; peculiarities of touch, taste, and smell; fracture, the character of their newly broken surface, as even, conchoidal and splintery; lustre, as metallic, semi-metallic, pearly, vitreous, adamantine, greasy, and silky; appearance, as opaque, transparent, and translucent; structure as laminated, fibrous, and granular; streak, the appearance of a cut in the mineral by a knife. Hardness is deter-

mined by Mohs' table, which is: (1) talc, (2) gypsum, (3) calcite, (4) flourspar, (5) apatite, (6) potash-felspar, (10) quartz, (8) topaz, (9) corundum, (10) diamond. No. 1 is the softest, and No 10 the hardest, mineral in this table. Hardness of a mineral is tested by scratching; a hard mineral scratches, but cannot be scratched by a softer mineral. If a mineral will scratch (3) calcite, but will not scratch (4) fluorspar, though (4) fluorspar will scratch it, then its hardness is $\frac{3}{4}$.

MINERAL OILS. See Oils.

MINERAL PRODUCTION, AMERICAN. The United States has long held first rank in the production of most of the serviceable minerals, and, in fact, its natural resources include nearly every metal and mineral known in art and industry. It is estimated that the country contains more mineral lands in proportion to its total area than any other nation. The mineral industry did not begin to be important till 1850, yet even down to 1880 the total annual mineral production was well under $400,000,000 in value, while today the yield of mine and quarry products has an approximate value of $4,000,000,000. The greatest development has occurred in the production of iron, copper, lead, zinc, and aluminum among metals, and coal, petroleum, natural gas, cement and clay products among non-metallic minerals. The most widely distributed mineral is coal, which is regularly mined in most of the states.

The value of mine and quarry products in the United States in 1921 was $4,053,000,000, or metallic $657,540,000 and non-metallic $3,395,460,000. Mineral fuels were produced to the value of $2,708,630,000. Bituminous coal retained its customary lead with a production of 406,925,000 short tons, valued at $1,237,000,000. Petroleum was the next chief product, yielding 469,639,000 barrels with a value of $753,300,000. Anthracite coal was next with 80,799,867 long tons worth $452,304,903, followed by pig iron, 16,000,000 long tons valued at $394,000,000. Natural gas yielded 807,670,000 units of 1,000 cubic feet, value $200,302,000; cement 95,820,997 barrels, value $178,981,533; stone, 62,400,000 short tons, worth $92,500,000; iron ore, 26,652,528 long tons, value $89,745,308; copper, 505,586,098 pounds, value $65,221,000; silver, 53,052,441 troy ounces, value $53,052,441; sand, moulding, building, etc., 75,093,000 short tons, value $50,302,000; gold 2,422,006 troy ounces, value $50,067,000; refined lead 398,222 short tons, value $35,840,000; salt, 4,981,154 short tons, value $24,557,966; lime, 2,531,000 short tons, value $24,536,000; gypsum, 3,050,984 short tons, value $23,700,290; and zinc 198,232 short tons, value $19,823,000. On a lesser scale the production of aluminum, asphalt, clay, mineral waters, mineral paints and pigments, phosphate rock, platinum, glass sand, slate, and a variety of other mineral products constitute important industries. Small quantities of gems and precious stones are found in the United States including corundum (sapphire) of which the quantity mined in 1920 was worth $482,745, as well as tourmaline and turquoise in negligible quantities. Diamonds, opals and topazes, once sought, no longer appear to any extent in American mineral production.

Pennsylvania besides being almost the only producer of anthracite coal remains the leading producing state of bituminous coal, followed by West Virginia, Illinois, Ohio, Kentucky, Indiana and Alabama. Bituminous coal is also mined largely in Colorado, Virginia, Wyoming, Iowa, Kansas, Oklahoma, Tennessee, Utah, Missouri, and Washington. Oklahoma in 1919 was the greatest producer of petroleum and natural gas, with Texas, California and West Virginia next in order. Other petroleum and natural-gas producing states are Kansas, Pennsylvania, Ohio, Louisiana, Illinois, Kentucky, Wyoming, New York and Indiana. The principal sources of iron ore are Minnesota and Michigan. Copper is chiefly produced in Arizona and Michigan. Lead and zinc have their centers in Oklahoma and Missouri. Colorado, Nevada and California contain most of the gold and silver lode mines. Pennsylvania in 1919 led as the chief producing state of limestone (mostly for cement), sandstone, clay, basalt and slate. Vermont and Massachusetts produce most of the granite mined in the United States, the former also mining much slate and marble. Florida is an important source of phosphate rock, as is Tennessee, which also produces marble. Gypsum is a product of New York and Iowa. Aluminum comes largely from Arkansas and asphalt from Utah, California and Kentucky. Graphite, or 'black lead' (no relation to metallic lead) is mostly produced in Alabama, New York (Adirondacks), Texas, Pennsylvania and California. Arizona is the main source of ores that yield molybdenum, used in steel-making. California and Texas have ores of mercury, which are mined to produce quicksilver. Nearly all the sulphur produced comes from Louisiana and Texas.

MINERAL WATERS are spring waters possessing characteristic or medicinal properties. They are widely diffused, chiefly in mountainous and volcanic districts. They may be cold or hot. Boiling springs, found in Iceland, etc., are called *geysers*. Many mineral springs were known to, and used by, the Romans. The waters may be used externally or internally; they are valued for their cleansing power upon the system.

The therapeutic value of the waters depends chiefly upon the presence in solution of salts of sodium, magnesium and iron, and carbon dioxide and hydrogen sulphide gases. Mineral waters may be classified as thermal, carbonated, alkaline, saline, chalybeate, sulphuretted, ciliceous.

In Dürkheim mineral water Bunsen discovered the alkali metals rubidium and casium. Other mineral waters, (*e.g.*) those at Bath and Buxton, are radioactive; the Bath water contains dissolved helium. Artificial imitations of natural mineral waters are manufactured, or the solid salts, (*e.g.*) Carlsbad salt, from which the waters can be made. Certain effervescing drinks are called 'mineral waters.' They should be made from distilled water, and are saturated with carbon dioxide under pressure. Salts, and flavoring essences, sugar and coloring are added, and the water is impregnated with the purified gas in special forms of apparatus. The necessary pressure—about 5 atmospheres—may be produced by pumping, by the evaporation of liquid carbon dioxide, or by the generation of the gas from chalk or marble within a confined space.

Mineral springs of many varieties are found in the United States and some of these are of great medicinal value. Among the most famous are those at Saratoga Springs, N. Y. White Sulphur Springs, Ark., and the Poland Water Springs, Me.

MINERAL WELLS, a city of Texas. Pop. 1920, 7890.

MINERSVILLE, a borough of Pennsylvania, in Schuylkill co. It is on the Pennsylvania, the Lehigh Valley, and the Reading railroads. The borough is in the center of an important coal mining region and its industries are connected chiefly with coal mining. Pop. 1920, 7,845.

MINERS, WESTERN FEDERATION OF (since 1916 the International Union of Mine, Mill and Smelter Workers), an organization of workers covering the industry indicated by the name, organized in 1893, in Butte, Montana. It first attracted wide attention by the strikes organized by its officials in the Coeur d'Alene region in 1892 and 1899. On this latter occasion provocation on the part of the agents and detectives of the mine owners including the assassination of public officials, temporarily brought the organization into disrepute, three of its officials, including William Haywood the secretary, being brought to trial for murder, but being later acquitted. The organization was affiliated with the American Federation of Labor in 1896 withdrew two years later, assisted in the organization of the Industrial Workers of the World, withdrew its support from them shortly after and again joined the A. F. of L. in 1911.

MINERVA, a Roman goddess, identified with the Greek Athena. Her worship was celebrated with that of Jupiter and Juno in the temple on the Capitol. Her festival, called *quinquatrus*, fell on March 19 and lasted five days. She was the goddess of wisdom and good counsel. A carved image of her, called the 'Palladium,' and supposed to have been carried from Troy by Æneas, was preserved in the temple of Vesta.

MINES, *Military Mines* are underground passages made by besiegers; the defenders sink *counter-mines*, which the attacking force tries to destroy by explosives.

MINES, BUREAU OF. A division of the Department of the Interior. Established May 15, 1910. Its business is to conduct inquiries into mining methods and to investigate mines, to secure efficiency, safety and economy in the mining industry, to test ores, coal, stone, and building materials, etc. No officer or employee of the bureau has any right, or authority to inspect, or supervise mines, or metallurgical plants of any state. The bureau has five divisions: mining fields, and mechanical equipment, metallurgy, mineral technology, and petroleum. Chief station Pittsburgh, which conducts a chemical research laboratory. An experimental mine is located at Bruceton, Pa., and analytical laboratory to test metals at Washington, D. C. chemical laboratory at Denver for ores a co-operative laboratory at Salt Lake City for smelting, and one at San Francisco for smelting fumes. Congress appropriated for the fiscal year ending June 30, 1922, $2,384,908.51. Disbursements, $3,654,957.73.

MINES, SUBMARINE, are contrivances designed to destroy enemy vessels by exploding under the surface of the water close to them. They consist of metal cases filled with high explosives fitted with a firing mechanism arranged

to explode the charge, either by contact or by electrical means. This weapon of defensive warfare was conceived in 1777 by David Bushnell who, at the time was working on one of the early submarine boats. Robert Fulton, in 1812, made several improvements on Bushnell's invention, but it was not until Colt, in 1863, added the electrical firing feature that the device was used to any extent. The Russo-Japanese War (1904-1905), in which they were first used extensively, demonstrated their effectiveness. In the World War (1914-1918) they were used in large numbers by both contestants. The mine fields of the North Sea, designed to bottle up the German submarines formed one of the most notable instances. The depth charges used by the Allies to destroy submarines may be considered as submarine mines. These, when thrown overboard exploded either when they hit a submarine or when they reached a certain predetermined depth. The ordinary submarine mine may be either of the floating or fixed type. The former type are set adrift in the path of enemy vessels, and are exploded upon coming in contact with them. The rules of warfare provide that they be so arranged as to become inoperative a short time after being launched. The fixed type are anchored 10-12 feet below the surface in the path of ships, and may be further classified as follows: (*a*) Contact mines—exploded by contact with a ship. (*b*) Electrically fired by an operator on shore. These are sometimes also fitted with a contact firing device. (*c*) Fired by a timing device so set as to explode the mine upon the expected arrival of the enemy ships.

MINE WORKERS OF AMERICA, UNITED, a labor organization covering the whole of the coal mining industry in the United States, organized in 1890. It developed its first heavy gains in membership during the coal strikes of 1897 and 1903, in which it was signally triumphant over the coal operators, under the leadership of John Mitchell. The organization is almost 100 per cent complete in the mine districts of the Middle West and Pennsylvania, but in West Virginia the resistance of the operators to the efforts of the organizers has brought on a state resembling civil war. Its present membership is over 500,000. In the spring of 1920 a determined effort was made by the officials of the United Mine Workers to bring this field within their control. The operators responded with a lockout, and a great deal of bloodshed followed, martial law being declared in some districts. The situation has continued with inconclusive results. During the war against Germany the United Mine Workers entered into agreements with the coal operators covering the war period. In 1919 there was a general strike of the miners in the bituminous regions over new contracts to replace the war agreement, in which the miners were defeated, the Federal Government giving its support to the operators. One of the results was the Kansas State Court of Arbitration. The organization merely bided its time, however, and on March 31, 1922, a national coal strike was called, over 500,000 members of the union walking out, in both anthracite and bituminous fields. The issue was mainly over wage schedules and shorter hours. The strike was led by John L. Lewis, President of the United Mine Workers.

MINHO: (1) a river, 170 m. long, rising in Galicia, Spain, and flowing S. and S.W. to the Atlantic, forming latterly a northern boundary of Portugal. (2) a prov. of Portugal, see ENTRE MINHO E DOURO.

MINIATURE (Lat. *minium*, red lead); small painting, generally a portrait; originally signified picture on manuscript many examples of which have been preserved in Byzantine and mediæval MSS. The modern form of m. dates from the XIII. cent., as may be seen from the minuteness of drawings in illuminated MSS.; attained independence in XIV. cent. The Eng. and Flemish schools produced painters like Holbein, Schute, Oliver, and Betts, who, while generally executing large canvases, also painted m's. Nicolas Hilliard (1547-1619) is first famous painter of m's.

Though m. painting declined in the XIX. cent., it has of late years received a marked stimulus. Famous collections of m's are to be seen in the Pierpont Morgan Collection, Oxford, Wallace Collection and Louvre.

MINIMUM WAGE, a term which specifically refers to laws limiting the downward trend of wages paid to wage-workers, usually women. Until recently it has generally been held that laws of this nature invaded the right of free contract between employers and employees, but so deplorable have been the economic results of this policy in the degredation of womanhood and unemployment among men, that public sentiment is rapidly awakening in favor of checking the evil by means of legislation, minimum wage laws following closely behind laws limiting the hours of work. The latest states to pass

legislation fixing minimum wages were North Dakota, and Texas, in 1920, no such laws being passed in 1921. Texas repealed her law a year after it was passed. This left minimum wage laws in effect in twelve states, the District of Columbia and Porto Rico, all applying to women and minors only. The laws naturally vary much in the different states. Some fix a definite standard, below which no woman may be employed. Others authorize the formation of commissions, to whose discretion it is left to fix a standard. In 1919 Michigan and Montana both adopted the principle, for the first time in the United States, of 'equal pay for equal work' for men and women, both making it unlawful to pay women less than men for equivalent work. Massachusetts adopts the practice of publishing the names of employers who violate the minimum wage law, most of the violators being found among the owners of paper box factories. The Federal Government, in 1921, had before Congress, the Johnson-Nolan Bill, providing a wage of not less than $3.00 a day for all its employees.

MINING, engineering processes by means of which minerals are extracted from [below the ground and raised to the surface. Mining was known to the ancients, and is referred to in the Book of Job. It is mentioned on an Egyptian papyrus dated 1400 B.C.

In England the tin mines of the Scilly Isles were worked by the Phœnicians, but the m. was not very important until coal came to be used for fuel. In 1259 a charter was granted by Henry III. to the freemen of Newcastle-on-Tyne to 'dig for coals,' while others were granted by Henry VII. and Elizabeth. Before the invention of gunpowder in 1620 m. on a large scale was unknown, it was impossible to sink shafts to any depth, owing to the inrush of water and also the difficulties of haulage and ventilation. The use of explosives overcame the difficulty of sinking through obstacles such as solid rock, which previously could only be negotiated by pick and crowbar. The invention of the steam-engine furthered the advance of m., and overcame not only the difficulty of haulage, but also the inrush of water.

Mineral deposits are of two classes: Beds or seams, as iron ore, coal, or salt. These may be of either mineral or vegetable origin, but are generally of the former. Veins or lodes (See ORE), where the mineral fills what was formerly a fissure in the earth's surface. In the Colonies lodes are called reefs, a misleading term.

Before the sinking of a shaft is com menced, the locality has to be *prospect* by men who study the geological co ditions under which minerals occur; surface exploration is carried out, ar boring is resorted to. If minerals exi in a bed or seam below the surfac shafts are sunk. Two shafts are general used, one for haulage purposes and th other for ventilation. From the shaf numerous galleries are driven. Th mineral, after having been dug out, hoisted to the surface by mechanic devices which derive their power fro a steam-engine on the surface at th mouth of the shaft. The miners descen in a cage, also driven by the steam engine.

When the mineral exists in veins lodes, shafts are sunk similar to tho above mentioned, the operations bein practically identical. In the diamon mines of Kimberley, South Africa, th earth is dug out and sent to the surfac where it is exposed to the elements f some weeks. This causes disintegratio which is furthered by its being stirre into vats of water. The remaining débr is sorted and passed over a grease surface which, while allowing ston and rubble to pass, retains the diamond

In gold-mining the sand and earth shoveled into a trough or pan an sluiced with water. The metal, bein heavy, sinks to the bottom of the pa while the earth is carried off.

Sometimes mines of mineral wealt are discovered accidentally, as in th case of the Potosi silver mines, foun by an Indian clutching at a bush save himself from falling down a hillsid Marshall discovered gold in Californ in 1848 while making a race for th waterwheel of his mill.

MINING ENGINEERS, AMERICA INSTITUTE OF, an organization founde in 1871 by the professional elements the mining industry to promote th arts and sciences connected with th production of useful minerals and metal to work for the welfare of the worke in the industry and to have a gener forum in which may be discussed all th technical problems incidental to th administration and workings of mini enterprises. In 1923 the associatio had a membership of about 5,000. issues a monthly Bulletin from its hea quarters in New York, and three vo umes of its *Transactions* every year.

MINISTER. — (1) In ecclesiastic usage, originally signified a deaco whose duties included attendance priest; now more loosely used, especial in Presbyterian and Free Church to mean officiating person. (2) parliamentary language, the chief ser

ants of the State, (*e.g.*) Prime Minister.

MINISTRY, in theological sense, the Christian m., the Church as a calling, ministers of religion as a body; in political sense in Britain, the Prime Minister and the colleagues he chooses to act along with him as responsible executive of the country. The m. includes not only members of the Cabinet, but other officers.

MINK. See WEASEL FAMILY.

MINNEAPOLIS, a city of Minnesota, in Hennepin co., of which it is the county seat. It is on many important railroads, and on both banks of the Mississippi River. The famous Falls of St. Anthony are in the heart of the city. Minneapolis is connected with St. Paul by railway and electric lines. The total area of the city is 53 square miles. The city is attractively laid out and in proportion to its population has a greater park area than any other city in the United States. The river is spanned by many bridges, several of which are massive structures of steel and stones. The most notable of these is the great Northern Pacific Railroad viaduct. Minneapolis has many important industries and is best known for its flour mills. In the manufacture of flour it ranks first in the world. The total output is valued at over $100,000,000 yearly. It is also a great lumber producing center. Its other important industries include the manufacture of agricultural implements, machinery, building material, boots and shoes, wagons, woolen goods. The value of its manufacturing products is over $300,000,000 annually. The city has an excellent system of streets, and there are many beautiful private residences and public buildings. Among the latter are the city hall and court-house, Metropolitan Life buildings, Metropolitan Bank building, La Salle building, Minneapolis Institute of Arts, Post-Office, Auditorium, and a lumber exchange. There are many handsome churches. In the schools are enrolled over 60,000 pupils. The institutions for higher education include the University of Minnesota, St. Thomas College and the Minneapolis Academy. In the suburbs are Hamline College and Macalester College. Minneapolis was settled in 1849 and received its city charter in 1867. Pop. 1920, 390,498.

MINNEHAHA, FALLS OF, descend for about 50 feet in the Minnehaha river, Minnesota, a tributary of the Mississippi. The cascade, which flows in a beautiful glen, is about eight miles south of Minneapolis. Longfellow made the falls famous in Hiawatha. Minnehaha means 'laughing water.'

MINNESINGERS (fl. XII. and XIII. cent's), Ger. lyric poets; were mostly of aristocratic descent. They sang of love (*Minne*) and their language was Middle High German. Each poet composed his own verses and set them to music, thus great variety of poetical style arose. Contests were frequent; Walther von der Vogelweide outsung Heinrich von Ofterdingen, Wolfram von Eschenbach outsung Klingsor of Hungary. In time the M. degenerated and their subjects became gross. The knights ceased to write, and the Meistersingers, singers drawn from the craftsmen, flourished—the greatest being Hans Sachs of Nuremburg.

MINNESOTA, state of U.S., in center of N. border (46° 30′ N., 93° 20′ W.), is bounded on N. by Manitoba, Ontario; E. by Lake Superior, Wisconsin; S. by Iowa; W. by S. and N. Dakota; surface flat or undulating, rising from 650 ft. on S. to *c.* 2,200 ft. on N.E.; drained, by Mississippi, Minnesota, Red R., and other streams; many large lakes, including Mille Lacs, Red Lake, Lake Winnibigoshish. Cap. St. Paul; large cities, Minneapolis, St. Paul, Duluth, Winona, Hibbing. Agriculture is chief industry; produces large quantities of wheat and other cereals; great pine forests in N., maple, oak, ash farther S.; lumbering important; large quantities of iron produced; manufactures flour, leather, boots, clothing, machinery. Railway mileage is over 9,000. In 1688 the dist. was annexed to France. Eastern part passed from France to Britain in 1763, and after War of Amer. Independence was transferred to U.S. Western part was ceded to Spain in 1762, but was restored to France in 1803, from whom it was bought in same year by U.S., as part of Louisiana Purchase. Minnesota formed a part of Wisconsin Terr. for a time, and in 1838 part of it was incorporated with Iowa Terr.; organized as separate terr. (1849); admitted as state to Union (1858); sent large force to field on Federal side during Civil War. Area, 84,682 sq. m., of which 3,324 sq. m. are water (exclusive of Lake Superior); pop. 1920, 2,387,125. See MAP, U.S.

MINNESOTA RIVER, a tributary of the Mississippi, rises on the boundary between Minnesota and South Dakota, flows southeast in the former state, then runs northeast to the Mississippi, which it joins between Minneapolis and St. Paul. It is about 475 miles long and has a drainage of 16,000 square miles.

MINNESOTA, UNIVERSITY OF,

is a co-educational state institution situated in Minneapolis on the Mississippi. It has a graduate school; college of science, literature and the arts; schools of law, dentistry and chemistry; college of engineering and architecture; department of agriculture, including forestry, dairying, farm management and traction engineering; medical school, including courses in nursing and embalming; college of pharmacy; school of mines; teachers' college; and a university extension service. The university farm covers 420 acres and it has numerous experiment stations located throughout the state. No honorary degrees are conferred. The institution was first organized in 1851. There were 8,943 students and a faculty of 1250 in 1922 under the presidency of L. D. Coffman.

MINOR, in music, a term referring to intervals and scales which are a semitone less than the corresponding major. The M. scale is derived from the ancient Greek system, its peculiarity being that it possesses no leading note, or semitone below the tonic. There are in existence four forms of the M. mode. A common chord with a M. third is a M. chord or triad.

MINOR, a person under age. In English and American law the term generally used is *infant.* As opposed to *pupil,* it means a male over fourteen, or a female over twelve and under twenty-one. Ms. in this restricted sense are capable of consent, but are treated as persons of such inferior discretion and judgment as to require legal protection. Pupillarity, on the other hand, is a state of total incapacity.

MINORCA (39° 56′ N., 4° 5′ E.), one of Balearic Islands, Mediterranean; held by Britain, 1713-56, and again in 1763-82, when restored to Spain. Pop. 40,000.

MINOS, a semi-legendary king of Crete; the celebrated laws of Minos are attributed to him.

MINOT, a city of North Dakota, in Ward co., of which it is the county seat. It is on the Great Northern and the Minneapolis, St. Paul and Salt Ste. Marie railroads, and on the Mouse River. It is the center of an extensive lignite coal region. It has a State Normal School, public library, court-house, and a Federal building. Pop. 1920, 10,476.

MINOTAUR (classical myth.), a monster, partly man, partly bull, with a bull's head. He was ultimately slain by Theseus and Ariadne.

MINSK.—(1) (*c.* 53° N., 28° E.), government, W. Russia; area, 35,220 sq. miles; much of surface occupied by forests and swamps; capital, M.; principal industries, shipping, timber trade, fishing, distilling, agriculture. Pop. 3,000,000. (2) (53° 53′ N., 27° 33′ E.), town, capital of above, on Svisloch; seat of Gk. Orthodox and R.C. bp's; tobacco and leather manufactures. Pop. 115,000.

MINSTREL (Lat. *minister,* a servant); a wandering singer who was held in high honor during the Middle Ages; also known as *minnesinger* and *jongleur;* in the XIII. cent. the m. became the household entertainer.

MINT, the factory of a nation's currency. Barter was employed during early periods of Egyptian, Assyrian, and Chaldean civilizations, and in prehistoric Greece; there are traces, however, in all of different commodities forming standard of value. Fines in Sparta at close of VII cent. were made payable in cattle, and earliest Gk. coins were traced with head of cattle and called oxen; so in Italy, where *pecus* gave *pecunia,* and among Germanic races. Cattle, etc., were replaced everywhere by metal, often open rings; shekels appear in *Genesis.* talents in Homer; earliest coins had marks of private merchants who issued them.

Private money always disappeared before spread of social order. Lydians of Asia Minor were, according to Herodotus, first persons to strike gold and silver coins; their tyrant Crœsus (561-546 B.C.) abolished electrum as medium of exchange; this seems to have been beginning of state control of coinage; multitude of Gk. m's sprang up.

Ancient coins fill almost same place towards study of ancient history as heraldry does towards study of mediæval history. Servius Tullius (VI. cent. B.C.) is said to have established Rom. state m., abolishing other standards; Pippin the Short and Charlemagne in Capitularies ordered that no coin should be struck except at royal court, and that the *denarius palatinus* should be legal tender. Right of keeping private m. was, however, occasionally granted and often usurped by subjects throughout Middle Ages. Romans cast their copper coins, but method of striking is alone used in modern coinage. It is curious that ancient Britons had acquired art of coining before arrival of Romans, as is proved both by Cæsar's testimony and survival of coins; character of these coins points to trade connection with Greece; A.-S. England had many m's with, until *c.* 1000, independent dies; m. was established in Tower of London by 1329, and probably much earlier;

private money was gradually driven out by royal money, and by middle of XVI. cent. the m. in Tower was the sole one, as it ultimately remained. Scotland ceased to issue money 1709, Ireland at about same time.

MINT (*Mentha viridis*), a Labiate commonly cultivated for table purposes; propagates freely by means of suckers and from cuttings.

MINT, UNITED STATES, THE. There are three United States mints, located at Philadelphia, Denver and San Francisco. The principle assay office is in New York and there are eight smaller ones in other cities. The United States mint established in 1791 was an independent department until 1873, when it was placed under the Treasury Department as 'Bureau of the Mint' in control of a Director of the Mint who is responsible to the Secretary of the Treasury. At the Philadelphia machine shops all machines are made for the various plants, while the New York Assay Office supplies stamps and dies. An independent coinage plant was established in Philadelphia in 1912-1913 with the largest rolling mills ever employed in American coinage. Here are presses that cut 6 bronze, or 5 nickel planchets at a stroke. During the fiscal year ending June, 1922 the gold coinage was valued at $53,000,000. Silver dollars over 92,000,000 and 12,000,000 pieces were coined for other countries. Aggregate production of three mints $117,912,205. Value of gold in mints and assay offices, $540,-629,997.69. 5 cent nickels, 1,447,000 pieces. 1 cent bronze 9,181,000 pieces.

MINTING. See COINAGE.

MINTO, SIR GILBERT ELLIOT, 1ST EARL (1751-1814), *b.* Edinburgh; ed. Edinburgh and Oxford; viceroy at Corsica, 1794-96; cr. Baron Minto, 1797; app. Gov.-Gen. of India, 1807, and made notable frontier treaties; cr. Earl of M. and Viscount Melgund, 1813. Countess of Minto, *Life and Letters of Earl Minto.*

MINTO, GILBERT, JOHN MURRAY KYNYNMOND ELLIOT, 4TH EARL (1847), ed. Eton and Cambridge; served as soldier in Turk. army, 1877; in Afghan War, 1879; as volunteer in Egypt, 1882; military sec. to Gov.-Gen. of Canada (Lord Lansdowne), 1883-85; chief of staff in N.W. Canadian rebellion; Gov.-Gen. of Canada, 1898-1904; Viceroy of India, 1905-10.

MINTURNÆ, modern Minturno, anc. city, on Liris, Latium.

MINUCIUS, FELIX, MARCUS (fl. III. cent.), Christian apologist, traditionally a brilliant Rom. pleader; wrote earliest known Lat. apology, *Octavius*, a dialogue between Christian and heathen, modeled on Cicero.

MINUET (from It. *minuetto*, through Fr. *menuet*, small, dainty), a graceful dance for two persons, supposed to have originated in Poitou, France. It was set to music in $\frac{3}{4}$ time, and was performed slowly, and with much dignity. The name is also applied to the musical composition written to the time and rhythm of the dance, and is frequently introduced by Handel and Bach into suites. Beethoven developed it into the scherzo.

MINUSINSK (53° 42′ N.; 91° 30′ E.), town, on Yenisei, Yeniseisk, Russia-in-Asia; in vicinity are coal-and-iron-fields. Pop. 10,000.

MINUTE MEN, a body of militia formed in New England colonies before the outbreak of the American Revolution and prepared to serve in resisting British rule at a minute's notice. The principal enrollment was in Massachusetts, notably Boston.

MIOCENE (in geology), name proposed by Sir Charles Lyell for a subdivision for the Tertiary strata; no examples are found in Britain; it is best developed in Vienna basin; rich in fossils, including dinotherium, mastodon, deer, monkeys; remains of such plants as palms and conifers show that the conditions then existing were tropical.

MIQUEL, JOHANN VON (1829-1901), Ger. statesman; helped to found *Nationalverein*; aided reorganization of National Liberal Party, 1887; Minister of Finance, 1890-1900, attempted social and financial reforms.

MIQUELON, GREAT AND LITTLE, islands off the S. coast of Newfoundland, forming with the adjacent island of St. Pierre, a French colony, and covering a total area of 93 sq. m. G. and L. M. are connected by a narrow isthmus. The inhabitants are almost entirely occupied with the fisheries, the islands being barren and rocky, and unfit for agriculture. Capital, St. Pierre. Pop. about 6,000.

MIRABEAU, HONORÉ GABRIEL RIQUETI, COMTE DE (1749-91), Fr. statesman; pub. *Lettres de cachet*, 1782, protesting against usage to which he owed his confinements, *Considerations sur l'ordre de Cincinnatus*, 1785, and other political pamphlets; employed by government on mission to Prussia, 1786-87, but failed, and alienated ministry by attack on corruptions; returned to states-general, 1789, took

foremost place, and sought to establish constitutional monarchy; till his death prevented Assembly breaking with foreign powers, insisted on Crown retaining veto, and generally sought to mould constitution on known and tried models, but met with growing opposition of *doctrinaire* and fanatical politicians.

MIRABEAU, VICTOR RIQUETI, MARQUIS DE (1715 - 89), Fr. author and *f.* of the famous statesman of the Revolution; wrote *Ami des Hommes* and *La Philosophie Rurale.*

MIRABILIS, a genus of perennial plants (order Nyctaginaceæ). *M. jalapa* is the marvel of Peru, a fragrant garden plant with flowers of various colors.

MIRACLE is generally held to be the violation of the law of nature by the intervention of a higher power. Christianity makes the miracles in the life of Christ fundamental in Christian theology, (*e.g.*) the Virgin Birth and the Resurrection. Miracles are often regarded as a proof of Christianity; but this method of apologetic is not now so much relied on.

MIRACLE PLAYS. See DRAMA.

MIRAGE, an optical illusion seen in hot climates. Images of distant objects appear inverted either below the ground or in the atmosphere. The phenomenon is due to variations in density of successive layers of air.

MIRAJ (16° 50′ N.; 74° 41′ E.), native state, Deccan, Bombay, India; area, 564 sq. miles. Pop. 125,000. Miraj, capital of state. Pop. 20,000.

MIRANDA, FRANCESCO (*c.* 1754-1816), Span. - Amer. soldier; sought to liberate S. America from Spain; fought for Fr. Revolution; with Brit. aid established Colombian republic, 1806; Venezuelan republic established, 1810; captured, he died in prison.

MIRANDOLA (44° 53′ N.; 11° 3′ E.), town, Emilia, Italy; cathedral and ducal palace. Pop. 20,000.

MIRANZAI (HANGU) VALLEY (33° 32° N., 71° 6, E.), mountain valley, N.W. Frontier, India.

MIRFIELD (53° 40′ N., 1° 43′ W.), town, on Calder, Yorkshire, England; woolen and cotton industries, collieries. Pop. 12,000.

MIRROR, a glass or polished surface which shows images of objects by reflection. The Etruscans had m's of decorated thin metal discs, generally bronze; small metal m's were used by the Greeks and Romans, and such have been found in Cornwall. Glass m's coated with tin also appear to have been known to the Romans. Glass m's silvered with amalgam, mercury, and tin were made by the Venetians, and in 1665 twenty m. makers were sent from Venice to Paris. In 1835 J. von Liebig discovered a method of silvering glass by heating aldehyde in a glass vessel with an ammoniacal solution of nitre of silver.

Distorting (or comical) m's are concave or convex, and reflect a person as a short stout figure or a long thin one.

MIRZAPUR (25° 10′ N., 82° 34′ E.), town, on Ganges, Mirzapur, United Province of India; carpets, brassware. Pop. 1921, 32,332. Pop. 1,100,000.

MISDEMEANOR (law term), a crime which is not a felony and which does not carry the penalty attached to felony.

MISHAWAKA, a city of Indiana, in St. Joseph co., of which it is the county seat. It is on the Grand Trunk and the Lake Shore and Michigan Southern railroads, and on the St. Joseph River. The city has excellent water power and is an important industrial center. It has manufactures of rubber goods, plows, cement blocks, machine shop products, automobiles, cigars and leather goods. There is an orphans' home, a hospital, public library, several parks and a high school. Pop. 1920, 15,195.

MISHITCH, ZIVOYIN R. (1855), Serbian soldier; *b.* Struganika, dep. of Valjevo. In 1885, in the Bulgarian War, he commanded the 1st Batt. of the 5th Regiment. In 1914 he was assistant chief of the General Staff till Nov. 1914, when he was appointed commander of the 1st Army. On July 1, 1918, he was appointed chief of the General Staff. He is one of the most prominent personalities among Serbian military leaders.

MISHNA, the traditional commentary on the written Hebrew law, handed down orally until about the beginning of the 3rd century of our era, when it was finally committed to writing. The M. consists chiefly of the discussions of rabbis between the year 70 and the time of writing. After 200, still further discussions on the law and the M. went on in the schools both of Babylon and of Palestine. These further discussions constitute the Gemara, which, with the M., forms the Talmud.

MISIONES (*c.* 27° S.; 55° W.), territory, N. Argentina, between rivers Paraná and Uruguay, S. America; surface uneven and forest-covered; chief production, Paraguay tea; capital, Posadas. Area, 11,282 sq. miles. Pop. 1921, 62,159.

MISKOLCZ (48° 6′ N., 20° 49′ E.), town, Borsod, Hungary; flour, porcelain. Pop. 1920, 57,384.

MISPRISION, in law, the knowledge that some other person has committed treason or felony, and the wilful concealment of the fact, or the refraining from giving information to the law.

MISSAL, the Mass book of the Rom. Church, until about 750 A.D. generally called *Sacramentary.* The m. now in use is that ordered to be compiled by the *Council of Trent,* and officially declared the only one lawful by Pius V. in 1570. It superseded in some places older local rites (where the Rom. liturgy had not already superseded them) except in a few cases (see LITURGY). The present Rom. m. gives first a calendar, with all the feasts, etc., in the ecclesiastical year, then full directions as to times of celebration, vestments. This is followed by devotional exercises and then the 'proper of the season,' that is, the parts of Mass, collect, epistle, gospel, etc., which are different for each Sunday; then information as to special Masses, etc. 'High Mass' differs from 'Low Mass' in being celebrated with more pomp and at least three priests.

A priest must not celebrate alone; he must have a server. Different liturgical colors are used for the vestments, according to the season.

MISSI DOMINICI, the special representatives of Charles the Great, sent every year into the various districts of the empire to administer justice and report to the emperor.

MISSIONS. Modern missions for the spread of Christianity in foreign lands may be said to have had their real inception in the establishment in England of the Society for the Propagation of the Gospel in 1701, founded to maintain Anglican missionaries beyond the seas, and the religious revival of the same century, inspired by Wesley and Whitefield, which produced the formation of other missionary societies. Protestantism developed on a world-wide scale what earlier preachers began in carrying the gospel over the world as it was then known to them. These pioneers embraced St. Patrick, who evangelized Ireland in the fourth century; the monks that continued his work through Europe; St. Augustine, the first Archbishop of Canterbury (596-607); Boniface, a British missionary who converted Friesland, Hesse and Saxony in the eighth century; Ansgar of Amiens, who started Scandinavia on the way to Christianity; and the Greek missionaries who Christianized the Slavs of Austria and Russia in the tenth and eleventh centuries. Christianity also entered early into the Mohammedan countries, and followed the flag of colonizing nations, like England and Holland, as they acquired territory in distant regions where the Gospel was unknown.

The modern growth of Christianity is due largely to the efforts of American and British churches working through their numerous missionary organizations. In 1921-22 the churches of the United States received an income of $37,867,638 for foreign missions. Of this sum the Baptists collected $6,113,-523, Methodists (Episcopal) $11,520,-000; Presbyterians $4,700,000; Congregationalists $2,500,000; Protestant Episcopalians $1,700,392. Adventists $1,926,-261; and the Lutherans $630,000. The Baptists overseas work extends through India, China, Japan, Africa, the Philippine Islands, Mexico, South America and Europe. The Missionary Society of the Methodist Episcopal Church conducts missions over a like area, as does the Presbyterian boards of foreign missions, which have branches in Korea, Persia, Siam, Laos, Syria, Egypt and the Sudan. The foreign mission field of the Protestant Episcopal Church functions through its Domestic and Foreign Missionary Society and has a field including Africa, China, Japan, Cuba, the Philippines, South America and Haiti.

The leading British organizations are the Baptist Missionary Society, the London Missionary Society, the Church Missionary Society, the Wesleyan Methodist Missionary Society and the United Free Church of Scotland Foreign Missions.

MISSISSIPPI (29° N., 89° 7′W.), great river of N. America; second largest river in world; rises in Lake Itasca, in Minnesota, some 1560 ft. above sea-level, and flows, southward over 2,600 miles to Gulf of Mexico, roughly parallel to Alleghanies on E. and Rockies on W. Divides Minnesota from Wisconsin, Iowa from Wisconsin and Illinois, Missouri from Illinois and Kentucky, Arkansas from Tennessee and Mississippi, Louisiana from Mississippi; has drainage basin of nearly 1,240,000 sq. miles or over 40% of whole area of U.S. Its distance from Rockies is considerably greater than that from Alleghanies, which accounts for greater size of western affluents, among which Missouri is a much larger stream than the M. itself when they unite at St. Louis; other western affluents are Minnesota, Des Moines, St. Francis, White, Arkansas, and Red Rivers. Eastern tributaries are Wisconsin, Illi-

nois, Ohio (with tributaries Cumberland and Tennessee), Yazoo.

On either side of river are rich alluvial bottoms of large extent, at many points underlying ordinary level of stream, which is prevented from overflowing them by strong embankments; at mouth is large delta with many passages; river valley suffers from frequent floods, to prevent which government is extending and improving system of levées on enbankments. There is great river traffic carried on by specially constructed steamers; chief trading towns, Minneapolis, St. Paul, St. Louis, Memphis, New Orleans. M. was explored by de Soto, 1541, and by Fr. travelers, 1673; source discovered by Glazier, 1884.

MISSISSIPPI, one of southern states of U.S. (32° 37′ N., 89° 54′ W.), bounded N. by Tennessee, E. by Alabama, S. by Mississippi Sound, Louisiana, W. by Louisiana and Arkansas; surface flat along coast, rising to low hills never over 800 ft. in height; drained by Mississippi, Yazoo, Big Black, Pearl, Pascagoula, Tombigbee, Tennessee, and other streams. Cap. Jackson, large towns, Meridian, Jackson, Vicksburg, Natchez. Climate is semi-tropical; soil fertile; chief industry is agriculture; produces great quantities of rice, wheat, and other cereals; cattle, horses, sheep, and pigs raised; great crops of cotton grown. Nearly half of state is forested, and lumbering is important industry. Manufactures include cottons, cotton-seed oil, turpentine, resin, railway cars, etc. Railway mileage exceeds 4,500.

First permanently settled by French early in 18th cent., the first Fr. colony being founded by Iverville at Biloni; remained under Fr. control till 1763, when it was transferred to Britain, from whom it passed to U.S. at close of War of Independence. Organized as territory (1798), Mississippi was admitted as a state to Union (1817); seceded from Union (1861), and was scene of various battles during Civil War; submitted to Federal Government (1865), and was readmitted to the Union (1870). Mississippi has several times suffered from devastating floods. See MAP, U.S.

Government executive power is vested in governor, assisted by lieut.-governor and other officials; legislative authority is vested in senate of 45 members and house of representatives of 145 members, elected for four years by popular vote; state divided for purposes of local administration into 78 counties, and is represented in Congress by two senators and eight representatives The principal religious denominations are Baptist, Methodist, R.C., Presbyterian. Education is free, but is not compulsory; there are six universities and colleges within the state, including Mississippi Univ. at Oxford. Area, 46,865 sq. m., of which 503 sq. m. are water; pop. 1920, 1,790,618.

MISSISSIPPI AGRICULTURAL AND MECHANICAL COLLEGE is a co-educational institution for instruction in agriculture, engineering, textile arts, industrial education and general science, situated near Starkville, Mississippi. It was founded in 1878 and is supported by state and federal appropriations. The students in 1922 numbered about 1300.

MISSISSIPPI COLLEGE, situated in Clinton, Miss., is conducted under the auspices of the Baptist Church following its foundation by the Presbyterians in 1826. It has an academy and collegiate department. In 1922 the students numbered 375 and the faculty 18 under the presidency of J. W. Provine.

MISSISSIPPI SCHEME, or **MISSISSIPPI BUBBLE,** a financial scheme projected by John Law at Paris in 1717 for the colonization and cultivation of the banks of the Mississippi. Shares were issued which rapidly rose in value owing to the report that there were gold and silver mines in those parts; and the company, which assumed the title of the Compagnie des Indes, undertook the management of the mint and farmed the revenue from the government, so that not only did the company control practically the whole colonial trade, but it had in its hands the management of the currency and the finance of France. By 1719 shares had risen as high as $4000, and in 1720 Law made an attempt to amalgamate the company and the Banque Royale. Then came the crisis, people began to lose confidence, and a run was made on the bank, which eventually stopped payment. Law escaped from France in December of the same year.

MISSISSIPPI, UNIVERSITY OF, situated in Oxford, Miss., is a co-educational institution founded in 1844 upon the sale of lands granted by Congress and supported by state appropriations. Its departments include governmental science, law, engineering, pedagogy, medicine and pharmacy, besides collegiate courses. In 1922 there was a student roll of 678 and a faculty of 37 under the presidency of J. N., Powers.

MISSISSIPPI VALLEY, EXPLORATIONS IN. See ARCHAEOLOGY.

(38° 21′ N., 21° 25′ E.), fortified town, Acarnania and Ætolia, Greece, on Gulf of Patras; Byron died here in 1824. Pop. 8,600.

MISSOULA, a city of Montana, in Missoula co., of which it is the county seat. It is on the Chicago, Milwaukee and St. Paul and the Northern Pacific railroads, and on the Missoula River. It is the center of an important farming, fruit growing, lumbering and mining region. It is the seat of the State University and has a Carnegie library, Federal building, a hospital and a high school. Pop. 1920, 12,668.

MISSOURI (38° 50′ N., 90° 7′ W.), river, U.S.; chief tributary of Mississippi; rises in Rockies; formed by union of Jefferson, Gallatin, Madison, receives Dakota from N., Yellowstone, Little M., Cheyenne, White, Platte, Kansas, Osage from S.; length, *c.* 3000 miles; navigation difficult; joins Mississippi river near St. Louis; discovered by Fr. explorers.

MISSOURI, one of E. central states of U.S. (38° 32′ N., 92° 25′ W.), bounded N. by Iowa, E. by Illinois, Kentucky, Tennessee, S. by Arkansas, W. by Oklahoma, Kansas, Nebraska; surface flat or undulating in N., with wide stretches of prairie in N.W.; to S. of Missouri R. the Ozark Mts. reach height of *c.* 3,000 ft. Rivers are the Mississippi, which has course of over 550 m. along E. border; the Missouri, which divides state a little to N. of center; Grand, Chariton, Osage, Meramec, and other streams. Cap. Jefferson; large towns, St. Louis, Kansas City, Springfield, St. Joseph, Joplin.

Principal industry is agriculture; Missouri produces heavy crops of corn, wheat, oats, hemp, flax, cotton, tobacco, fruit; cattle, pigs, and sheep reared; minerals include coal, zinc, lead, petroleum, copper. Important industries are slaughtering and meat packing, flour milling, lumbering, boot making, printing, iron-founding. Railway mileage exceeds 9,000. See MAP, U.S.

Missouri was visited by de Soto in 1542, but was not permanently settled until 18th cent., Ste. Geneviève being founded in 1755, St. Louis in 1764; in 1762 it was ceded by France to Spain as part of 'Louisiana'; it was included in the Louisiana Purchase of 1803, thus coming into possession of the U.S. Its admission to the Union was a subject of long and acrimonious dispute, which resulted in the *Missouri Compromise* of 1820, whereby slavery was forbidden north of lat. 36° 30′. Admitted as state to Union (1821), in Civil War Missouri was divided, providing forces for both sides, and was scene of great number of engagements. Since conclusion of war, history of Missouri has been one of increasing prosperity.

Government: executive power is held by governor, who is assisted by other state officials; legislative authority is vested in senate of 34 members and house of representatives of 142 members, elected respectively for four and two years by popular vote. State is subdivided for purposes of local administration into 114 counties, and is represented in Federal Congress by 2 senators and 16 representatives. Education is free and obligatory; there are many universities and colleges, state univ. being at Columbia, while other towns containing important colleges are St. Louis, Liberty, Cameron, Springfield. Area, 69,420 sq. m., of which 693 sq. m. are water; pop. 1920, 3,404,055.

MISSOURI COMPROMISE. An Act of Congress passed in February, 1821, when Missouri was admitted to the Union as a slave state, declaring all territory west of Missouri and north of latitude 36° 30′ should be free of slavery forever. When territorial governments were established for Kansas and Nebraska the Compromise was practically repealed.

MISSOURI, UNIVERSITY OF, is situated at Columbia, Boone co., Mo., and was founded by the State in 1839. It is supported partly by both state and federal appropriations. The tuition, which is co-educational, embraces arts, sciences, agriculture, education, law, medicine, engineering, mines, metallurgy, journalism, business, public administration, graduate courses and extension work. The grounds cover more than 800 acres and contain fifty buildings, while the university has also a forest of 50,000 acres in the Ozark Mountains. In 1922 the student roll numbered 5300 and the faculty 283 under the presidency of J. C. Jones.

MIST, transparent fog.

MISTLETOE (*Viscum album*); a semiparasite growing on apple, oak, and other trees, from which it absorbs nutriment by means of suckers. M. had an important place in the religious ceremonies of the Druids, to whom it was sacred, especially when found on the oak.

MISTRAL, FRÉDÉRIC (1830-1914), Provençal poet, of peasant origin; started with six other Provençal poets the *Felibrige* movement (1854); published *Mireio* (1859), which won him fame and has been set to music, many other poems, a Provençal dictionary

of about ten thousand words (1886), *Memoires et Recits* (1906); awarded Nobel prize (Literature), 1904.

MITAU (56° 39′ N., 23° 42′ E.), town, Courland, on Aa; residence of Dukes of Courland in XVI cent.; trade in grain and timber. Pop. 1920, 19,643.

MITCHEL, JOHN PURROY (1879-1918), New York municipal official; *b.* Fordham, N. Y.; *d.* near Lake Charles, La. He was the grandson of John Mitchel, the Irish patriot. He became a lawyer after graduating from Columbia University in 1901, and entered municipal affairs in 1906 as special city counsel, then as commissioner of accounts and president of the board of aldermen. President Wilson made him Collector of the Port of New York in 1913. In that year he was also nominated for mayor on a fusion ticket, winning the election, and holding office till 1917, when he was defeated for re-election by John F. Hylan. In January, 1918, he joined the U.S. Aviation Corps as a major and in July was killed in a flight over Gresner Field, Louisiana, while training for air service in the World War.

MITCHELL, a city of South Dakota, in Davison co., of which it is the county seat. It is on the Chicago, St. Paul, Minneapolis and Omaha, and the Chicago, Milwaukee and St. Paul railroads. It is the center of an extensive agricultural region and has manufactures of well boring machinery and chemicals. It is the seat of Dakota University. Pop. 1920, 8,478.

MITCHELL, DONALD GRANT (1822-1908), author (better known as 'Ik Marvel'); *b.* Norwich, Conn.; *d.* Edgewood, Conn. He studied law in New York after graduating from Yale in 1841, engaged in journalism, traveled abroad and in 1847 published his first work, *Fresh Gleanings*, which recorded his impressions of Europe. His most popular book was *Reveries of a Bachelor*, 1850. He was American consul at Venice from 1853 to 1855, after which he spent the remainder of his life writing on his Connecticut farm.

MITCHELL, JOHN (1870 - 1919), labor leader; *b.* Braidwood, Ill. He became a coal miner at thirteen and worked at his calling in a number of western states, studying meantime and taking part in the labor movement. From the formation of the United Mine Workers in 1890 he was an active member of that body and filled various executive posts. From 1899 to 1908 he was president of the organization and from 1908 to 1914 a vice-president of the American Federation of Labor. He was closely identified with labor bodies and legislation in New York State. He wrote *Organized Labor*, describing its aims and ideals, and *The Wage Earner and His Problems*.

MITCHELL, JOHN AMES (1845-1918), editor and artist; *b.* New York City. He graduated from Harvard, studied art in Boston and Paris, and practiced as an architect in the former city from 1867 to 1870. Afterwards he turned to decorative work, studying further abroad, and from 1880 to 1883 engaged in journalism and illustrating in New York City. In 1883 he founded the humorous weekly, *Life*, and edited it till his death.

MITCHELL, MARIA (1818 - 1889), astronomer; *b.* Nantucket, Mass.; *d.* Lynn, Mass. As the daughter of an astronomer of note, William Mitchell (1791-1868), she early acquired a knowledge of the firmament, and pursued the science as librarian of the Nantucket Athenaeum, a post she filled for twenty years. She discovered a comet in 1847, and later several nebulae. From 1865 to 1888 she was professor of astronomy at Vassar College. The Maria Mitchell Observatory at Nantucket is dedicated to her memory. She was the first woman to become a member of the American Academy of Arts and Sciences.

MITCHELL, SILAS WEIR (1829-1914), novelist and physician; *b.* Philadelphia. He began the practice of his profession in his native city in 1850 after graduating from the University of Philadelphia and the Jefferson Medical School. During the Civil War he had charge of a federal hospital. As a physician he specialized in nervous diseases and contributed extensively to medical journals. To the general public he was best known as a novelist and poet. His most notable works were *Hugh Wynne, Free Quaker*, 1897, an historical novel of the Revolution, and the *Adventures of Francois*, 1899. He developed the 'rest cure' or Weir Mitchell treatment for nervous disorders.

MITES AND TICKS (*Acarina*, an order of *Arachnida*), small Arachnids, most degenerate and mostly parasitic, living on plants or animals or even on decaying organic matter. The body is fused to the thorax, and is often round, although in a few it is cylindrical; and there are usually present biting or piercing mouth-parts, and four legs armed with hairs or claws for attachment.

Examples of mites, which are usually very minute, are the Cheese-Mite

(*Tyroglyphus*); the Follicle-Mite (*Demodex folliculorum*), in hair-follicles; the human Itch-Mite (*Sarcoptes scabiei*); and the minute so-called 'Red Spider' (*Tetranychus*), common on garden bushes.

Ticks, which are larger, and pea- or bean-like when swollen with blood, occur especially on birds and mammals, and even on snakes. They are often disease-carriers and dangerous pests. *Rhipicephalus* distributes the parasite of Red Water or Texas Fever among cattle; *Ornithodorus* spreads human 'tick-fever' in Central Africa; *Ixodes* is common on sheep and dogs.

MITFORD, MARY RUSSELL (1787-1855), Eng. novelist; wrote plays and verse and much miscellaneous prose, but had her greatest success with the sketches of homely life pub. under the title of *Our Village*.

MITFORD, WILLIAM (1744-1827), Eng. historian; pub. *History of Greece*, 1784-1810, marred by political bias and lacking style, for long a text-book, but now superseded.

MITHRADATES, name of several Oriental kings; Persian appellation signifying 'given by Mithras,' (*i.e.*) the sun god; most famous bearers, kings of Arsacid dynasty of Parthia and kings of Pontus.—M.I. (Arsaces VI.) conquered Media, Assyria, and several Gk. cities; defeated Demetrius II., Nicator, 138 B.C.; first great Parthian monarch. —M. II., king of Parthia (*c.* 120-88 B.C.) called 'king of kings'; first to establish communications with Rome.—M. VI., Eupator, king of Pontus (131-64 B.C.); dangerous enemy of Rome, with whom he waged two wars; hero of eastern romance.

MITHRAS, an Oriental deity regarding whom we know little, owing to the religious zeal of Mohammed and his followers. From monumental and scant documentary evidence, the following story is constructed: after a miraculous birth from a rock, witnessed only by some herdsmen, M. asserted dominion over the sun, and by its aid slew a bull sacred to Ormazd (god of light); and in spite of efforts to prevent it on the part of Ahriman (god of darkness), sacrificed it, thus creating the human race. He finally left the earth and became an immortal.

MITRAILLEUSE. See MACHINE GUN.

MITRE, a high, pointed cap with a cleft in the middle, worn as ecclesiastical head-dress by bp's and certain abbots. Until the X. cent. it was only a papal cap, worn out of doors, but later it became a regular ecclesiastical vestment. It was soon regarded as one of the special insignia of a bp., but the popes granted permission to wear it to important abbots. In the R.C. Church m's are often very tall, though originally shorter.

MITTWEIDA (50° 58′ N., 12° 58′ E.), town, on Zschopau, Saxony; textile industries. Pop. 18,000.

MIVART, ST. GEORGE (1827-1900), Eng. medical practitioner and biologist.

MIZRAIM, Old Testament name for Egypt; according to some the term is used of a district outside Egypt proper, near Gulf of Akaba; a Musri, which may have been in Arabia, is mentioned in Assyrian chronicles.

MNEMONICS. (1) Art of aiding the memory; (2) devices for aiding the memory, (*e.g.*) mnemonic verses. The principle of these devices is to associate what is not easily remembered with the thought of something else which is easily learned and remembered, (*e.g.*) with verses which, even if nonsensical, are rhythmical, like the 'Barbara, Celarent,' etc., of formal logic, and which may have sense, rhythm, and rhyme, like 'Thirty days hath September,' etc. The composition of mnemonic devices was popular in ancient Greece and Rome, and in the XV. to XVII. cent's of our era.

MOA. See under RUNNING BIRDS.

MOAB, a territory to the S. of Israel, occupying the high plateau to the E. of the Dead Sea.

MOABITES, a pastoral, Semitic race, formerly dwelling to the E. of the lower Jordan and the Dead Sea, but now extinct or merged with the Arabs. According to the Old Testament, they were the descendants of Lot, and were made tributary by Saul and David. Solomon married women of Moab. Mesha, king of Moab, subsequently revolted against Israel, recovered territories, and fortified cities, and regained independence, defeating Jehoram, king of Judah. Its later history is obscure. But in the IX. cent. B.C. Moab had a definite civilization, with a similar language and culture to that of the Israelites. Its national god was Chemosh.

MO'ALLAKAT, AL-MO'ALLAQAT, a collection of ancient Arabic poems written between 520 and 660 A.D., and compiled, probably by Hammād the Rhapsodist, during VIII. cent. The name signifies 'hung up,' and is explained by the legend that they were thus placed on the Ka'ba (shrine) at Mecca; simpler explanation is that they were a 'string' of poems. They are pre-

Islamic in time, and only one of the writers, Labid, became a follower of Mohammed. The collection consists of seven long poems by as many different writers, whose names and life-histories have been preserved.

MOBERLY, a city of Missouri, in Randolph co. It is on the Wabash and the Missouri, Kansas and Texas railroads. Its industries include the manufacture of carriages, flour, tobacco, etc. It has railroad and car shops and is the center of a large agricultural and live-stock region. It has several educational institutions and a hospital. Pop. 1920, 12,808.

MOBERLY, GEORGE (1803-85), Anglican clergyman; headmaster of Winchester, 1835-66; bp. of Salisbury, 1869.

MOBILE, a city of Alabama, in Mobile co., of which it is the county seat. It is on the New Orleans, Mobile and Chicago, the Louisville and Nashville, the Southern, and other railroads, and on the Mobile River, near Mobile Bay, 30 miles from the Gulf of Mexico. Mobile is one of the most important industrial centers of the South. Its industries include the manufacture of shingles, tobacco, blinds, flour, confectionery, saddlery, harness, clothing, etc. It has also a large trade with Mexico and Central and South America. The public buildings include United States government building, court-house, United States Marine Hospital, city hospital, Odd Fellows' Hall, Temperance Hall, and a battle house. It has several important educational institutions including the College of St. Joseph, Spring Hill College, McGill Institute, Barton Academy and other private academies. ¶ Mobile was first settled in 1702 when a fort was built on the site by Le Moine de Bienville. The colony was ceded to Great Britain in 1763 by the Treaty of Paris and in 1783 was transferred to Spain. In 1813 it was captured by an American army under General Wilkinson. A city charter was received in 1819. Mobile was captured by Admiral Farragut on August 5, 1864 after a great naval battle in which Admiral Farragut, with a Union fleet, captured and destroyed the Confederate fleet and forts. Pop. 1920, 60,777.

MOBILE BAY, an estuary of the Gulf of Mexico. It is from 8 to 18 miles wide and about 35 miles long. Its general direction is north to south.

MOBILE RIVER, a river in Alabama formed by the junction of the Alabama and the Tom Bigbee, about 45 miles above the city of Mobile. It enters Mobile Bay by two mouths.

MOBILIZATION. See ARMIES; ARMY, UNITED STATES; WORLD WAR.

MOCCASIN, the shoe of the N. American Indian. Originally, an ingenious covering for the foot made all in one piece of untanned skin. Its advantage for the hunter or scout is obvious. The form and style differed with different tribes and individual fancy; it has given place largely to similar articles made in leather and in several pieces.

MOCCASIN SNAKE (*Ancistrodon contortrix*), or **COPPER HEAD,** a poisonous brown snake, with black and brown markings, growing to about 3 ft. in length. It is found in N. America, where it inhabits marshy districts, feeding on other reptiles, birds, and small mammals.

MOCHA. See MOKHA.

MOCKING-BIRD (*Mimus polyglottus*), an Amer. Perching Bird related to the Wrens; famous for its powers of song and imitation.

MOCK ORANGE, or *Philadelphus coronarius*, a hardy shrub, order Saxifragaceæ, with large creamy-white flowers, possessing a fragrance rather like that of orange blossoms.

MODEL FARMS. See AGRICULTURAL EDUCATION.

MODELS used for making metal casts are generally worked in wood, and from them a plaster or clay cast is made to form the mould into which the molten metal is poured. Before beginning to work in stone the sculptor makes a m. in wax or clay, and m's of various organs are used in teaching anatomy and physiology. M's are of great value in math's, particularly in the representation of geometrical figures, and in the teaching of physics m's assist the mind to grasp conditions which scarcely can be expressed in words. There are also working m's for demonstrating physical laws, the working of machinery, the inter-relation of geometrical figures, etc. Experimental m's are constructed by inventors in order to study the action of machines afterwards to be built on a large scale.

MODENA, (44° 38′ N.; 10° 55′ E.), town, N. Italy; belonged in turn to Etruscans, Romans, Goths, Lombards; held by Este family, with interruptions, from 1288 till 1860, when it was incorporated in Italy. M. is archiepiscopal see, has XII. cent. Romanesque cathedral; univ. dates from 1683; fine ducal palace, museums, art-galleries, observatory; formerly strongly fortified; has

citadel. Manufactures include woolen and hemp fabrics, leather, silk, glass. Pop. 77,000.

MODERNISM, ecclesiastical term applied to theories and doctrines tinged with radicalism or 'advanced' thought, which in the opinion of the authorities of the Roman Catholic Church are at variance with or tend to throw doubt upon the traditional doctrines of the church. Owing to the uneasiness caused among the more orthodox minds by the increasing boldness and prevalence of such writings, Pope Pius X (1903-14) issued in 1907 his famous encyclical dealing with the Modernist movement. 'It is impossible,' he said in part, 'to approve in Catholic publications of a style inspired by unsound novelty which seems to deride the piety of the faithful and dwells on the introduction of a new order of Christian life, on new ordinances of the Church, on new aspirations of the modern soul, on a new vocation of the clergy, on a new Christian civilization.' Diligence and severity were enjoined upon the authorities in the selection and examination of those seeking holy orders. Books of the character denounced were not permitted to come into the hands of university students or seminarists. Secular priests were forbidden without the consent of their superiors to undertake the direction of papers or periodicals. 'Anyone,' the Pope says in another part of the encyclical, 'who in any way is found to be imbued with modernism is to be excluded without compunction from these offices and those who already occupy them are to be removed.'

MODESTO, a city of California, in Stanislaus co., of which it is the county seat. It is on the Southern Pacific Railway and the Tuolumne River. The city is the center of an important grain, fruit and wool growing region which has been greatly developed by irrigation. It has a court-house, public library, and a county hospital. Pop. 1920, 9,241.

MODICA (36° 52′ N., 14° 46′ E.), town, ancient *Mutica*, Syracuse, Sicily. Pop. 50,000.

MODJESKA, HELENA (1840-1909), Polish actress; real name Modrzejewski; famous in tragic and comedy roles; settled in U.S.

MÖDLING (48° 6′ N., 16° 17′ E.), town, summer resort, Austria; iron manufactures. Pop. 18,000.

MODOCS, a N. American tribe of a warlike and agressive nature, formerly dwelling on the extreme N.E. frontier of California. Originally they formed one tribe with their northern neighbors, the Klamath, and on seceding from this tribe, established themselves on Lost R. Most of them perished in the revolt of 1873, and some of the survivors were transported to the Nuapaw reservation in Indian territory, though a few, numbering about 225, were returned to the Klamath reservation, Oregon.

MOERIS, LAKE OF, old name of expanse of water, Fayum, Egypt; now a small lake named Birket el Kerûn.

MOESIA (*c.* 43° N., 22° E.), old Rom. province, S.E. Europe; now included in Serbia and Bulgaria; settled by Goths in III. cent., subsequently by Slavs.

MOEWE, Ger. raider (2,000 tons), formerly *Ponga*, commanded by Captain Count von Dolina Schlodien; disguised as Norweg. fruit trader, eluded Brit. blockade in North Sea, Jan. 1, 1916; captured Cardiff coaler *Corbridge* off Cape Finisterre; encountered Brit. mail steamer *Appam* N. of Madeira, Jan. 16, released twenty Ger. prisoners of war on board, and Ger. crew under Lieut. Berg took *Appam* to Hampton Roads, U.S. *Moewe* sank Brit. liner *Clan Mactavish*, Jan. 16, and after cruising about and sinking other ships, arrived back at Kiel, March 5.

MOFADDALIYAT, MUFADDALIYAT, collection of ancient Arabic poems compiled during later part of VIII. cent., by al-Mufaddal, a native of Kûfa who, pardoned by Caliph al-Mansûr for revolt, in 762, was appointed tutor to son of caliph, at whose suggestion he made his anthology.

MOFFAT (55° 21′ N., 3° 27′ W.), watering-place, Dumfriesshire, Scotland; mineral springs.

MOFFAT, ROBERT (1795-1883), Brit. missionary; sent to Africa, 1816; worked in Bechuanaland and Namaqualand; colleague of Livingstone; translated Bible.

MOGADOR (31° 30′ N., 9° 15′ W.), seaport town, Morocco, on Atlantic; exports goat-skins, almonds, olive oil. Pop. 25,000.

MOGILEV, MOHILEV (*c.* 53° 30′ N., 31° E.), government, W. Russia; area, 18,514 sq. miles; cereals, honey, potatoes, hemp.

MOGILEV, MOHILEV (53° 53′ N., 30° 22′ E.), town, on Dnieper; capital of Mogilev; manufactures leather, tobacco; seat of Gk. and R.C. abps. Pop. 50,000.

MOGILEV, MOHILEV (48° 30′ N., 27° 50′ E.), town; on Dniester; Podolia, Russia; distilleries, breweries, active trade. Pop. 23,000.

MOGUL, GREAT, title of emperor of Delhi; first was Baber.

MOHÁCS (45° 58′ N., 18° 37′ E.), town, on Danube, Baranya, Hungary; busy trade; noted in Hungarian history. Pop. 16,500.

MOHAIR, wool of Angora goat.

MOHAMMED. See MUHAMMAD.

MOHAMMED V. (*Reshad Effendi*) (1844-1918), Sultan of Turkey; brother of Abdul Hamid II. (*q.v.*) and son of Sultan Abdul Medjid. He succeeded to the throne in 1909, when in his 65th year, upon the deposition and exile of Abdul Hamid and after being in captivity as a state prisoner for many years. The Young Turk party dominated his reign and he was more than ever a figurehead during the World War.

MOHAMMERAH. See MUHAMRAH.

MOHAVE DESERT, an arid district spreading over San Bernardino county in California and into Arizona, forming part of the Colorado Desert. It is penetrated by the Mohave river for some distance.

MOHAWK RIVER rises in Oneida county, New York State, and flows S.E. to the Hudson at Cohoes, nine miles above Albany. It has a number of falls and rapids, notably the Cohoes Falls. The Erie Canal runs parallel with the river to Rome, N.Y. Considerable water power is obtained from the river for industrial plants located in the Mohawk Valley. Some of the most important engagements of the American Revolution took place there. The river is about 160 miles long.

MOHAWKS, an Indian tribe originating in the northern part of New York State, especially in the Mohawk Valley, and the principal member of the Six Nations, collectively designated by the French as the Iroquois. They spread from Lake Champlain to the headstreams of the Susquehanna and the Delaware and as a powerful warlike tribe dominated a wide area in early colonial times. Their power waned after the Revolution, in which they sided with the British, and many of them migrated to Canada, where more than 1,000 still dwell on lands assigned to them on Lake Ontario.

MOHICANS, a branch of the Algonquin stock, who originally inhabited the Hudson Valley, but were driven eastward by the Mohawks. They sided with the colonists during the revolutionary war, and are now practically extinct.

MOHL, HUGO VON (1805-72), Ger. botanist; *b.* Stuttgart; ed. Tübingen; took medical degree; app. prof. of Bot. at Tübingen, 1832; author of several treatises, notably regarding palms and tree-ferns.

MOHMAND, Pathan tribe, inhabiting hilly country North-West Frontier Province of India; Afghans by descent and formerly under allegiance of Afghanistan, but placed under Brit. Government by agreement of 1893.

MOHUN, CHARLES MOHUN, 5TH BARON (*c.* 1675-1712), Eng. duellist; at age of seventeen was tried for murder and acquitted; tried as accessory to murder of Mountjoy, the actor, by Captain Hill, and found not guilty, 1693; fought duel with 4th Duke of Hamilton, and both were killed.

MOIRÉ (Fr. *moire*, watered silk); now used exclusively to denote watered or clouded silk, though the actual process of calendering can be applied to any material, whether woolen and silk stuffs or linen. Formerly the term was interchangeable with mohair, a fine watered dress material made from the white silky hair of the Angora goat (*'mohair'* from Arabic *moukhayar*).

MOJI (33° 55′ N., 131° E.), seaport town, N. of Kiushiu, Japan; coalfields. Pop. 1919, 73,377.

MOKHA, MOCHA (13° 20′ N., 43° 10′ E.), seaport town, Arabia, on Red Sea; formerly large trade in 'Mocha coffee.' Pop. 5,000.

MOLA DI BARI (41° 3′ N., 17° 6′ E.), town, Apulia, Italy; exports grain, fruit, wine. Pop. 15,000.

MOLASSES. See SUGAR.

MOLAY, JACQUES DE (*d.* 1314), last of the Masters of the Templars; summoned by Pope Clement V. to undergo trial at Paris, and was sentenced to death by burning.

MOLDAVIA (46° 30′ N., 27° E.), a former principality of S.E. Europe; now the N.E. portion of Rumania.

MOLE FAMILY, TALPIDÆ, family of Insectivora containing about 35 species, all confined to northern hemisphere. Most have small eyes and ears, long skulls, and short limbs with flattened spade-like hands and feet for digging. The tunnels and 'mole-hills' of the common Mole (*Talpa*) are familar throughout Europe and most of Asia. It feeds upon insects, larvæ, and earthworms, as also do the Star-Nosed Mole (*Condylura*) of N. America, and the true Mole Shrews (*Urotrichus*) of N. America and Japan, all of which re-

semble the common Mole in their burrowing habits.

MOLECH. See MOLOCH.

MOLECULE. A molecule is the smallest particle of a substance that can exist alone. It is the unit of physical as distinguished from chemical phenomena. That matter is ultimately discontinuous has long been held, and the properties of thin films support this belief; nevertheless, the nature and behavior of gases furnish the most convincing evidence of molecular structure. The simple volume proportions in which gases combine (Gay-Lussac's law), and consequently the simple relations between the densities and combining weights of gases, led to Avagadro's hypothesis that equal volumes of all gases at equal temperatures and pressures contain the same number of molecules. This hypothesis has been confirmed by the kinetic theory of gases, which gives a satisfactory account of such phenomena as gaseous pressure, expansion, and diffusion. Thus the physical condition of a gas is referred to the mass and velocity of its individual molecules, and the study of its behavior becomes a problem in dynamics.

The sizes of molecules have been estimated in various ways, with fairly concordant results. An idea of their size may be gained from the statement that if a single drop of water were magnified to the size of the earth, the size of the molecules within it would be between that of small shot and cricket balls. The following mean values for molecular diameters have been calculated:

Hydrogen .....2·03—10^{-8}cm.
Nitrogen .....2·92—10^{-8}"
Oxygen .....2·70—10^{-8}"
Carbon dioxide ....3·33—10^{-8}"

More complex molecules are larger, though equal numbers always occupy the same volume in the gaseous state, owing to the large interspaces. The properties of gases, liquids, and solids depend upon the freedom of their molecules. The molecules of a perfect gas are free to move, but constantly collide with other molecules or the walls of the containing vessel. On account of this molecular freedom, gases are capable of indefinite expansion. The molecules of a liquid, while free to move about within its mass, must keep the same mean distance from each other. Consequently, a liquid has a volume, but not a shape of its own. The molecules of a solid possess vibratory power only, and keep the same mean position, so that a solid retains its own shape. The force holding molecules together is called Cohesion.

MOLESKIN, a kind of silk fabric having a thick soft shag similar to the fur of a mole; also a kind of shaggy cotton fabric which is used for workmen's trousers by reason of its good wearing qualities.

MOLFETTA (41° 12′ N., 16° 36′ E.), seaport, Bari, Italy; cathedral; active trade. Pop. 41,000.

MOLIÈRE, pseudonym of **JEAN-BAPTISTE POQUELIN** (1622-73), Fr. dramatist; *b.* Paris, son of upholsterer to Louis XIII. In 1643 joined troupe of actors, and soon took lead; acted for twelve years, first in Paris with indifferent success and more successfully in provinces, changing his name from Poquelin to Molière; began to write his own plays, and initiated modern comedy with his first studies of manners, *L'Etourdi*, his *essai d'ecrire*, acted in Lyons, 1653, and epoch-making *Le Depit Amoureux* (Béziers, 1656). In 1658 he returned to Paris, and under protection of king began literary campaign against extravagances, vices, and foibles of his time, brought from Italy and Spain.

In provinces, Molière used to sit in the market-place listening and noting; in Paris, he studied the court, the court tailors' and hairdressers' shops, etc., and found there his *Bourgeois Gentilhomme* 1670, and many other of his types. During first night of the *Precieuses Ridicules*, 1659, a voice called out from the pit: 'Courage, Molière; that is true comedy!' *L'Ecole des Maris*, 1661; *L' Ecole des Femmes*, 1662; *Le Mariage forcé*, 1664; *Don Juan*, 1665, were comedies of his first manner. He borrowed some subjects from Terence and other classical writers; this borrowing, as in the *Fourberies de Scapin*, 1671—from Terence—was more than adaptation, but the original element was never overpowered. The *Femmes Savantes*, 1672, continued the attack commenced in *Les Precieuses*; *Le Misanthrope*, 1666, is the most perfect of comedies of the classical school, and perhaps the best picture of its author's philosophy of life. *Tartuffe*, 1667, is satire against hypocrisy, especially in its religious form, on which ground it could not be played for four years and a half. *L'Avare*, 1668, was taken from Plautus's *Aulularia*. While acting the 'Malade' in the *Malade Imaginaire*, a piece of pure and broad humor, in 1673, Molière was taken ill and carried away from the stage dying.

MOLINA, LUIS (1535-1600), a noted Spanish Jesuit, *b.* at Cuenca, in New Castile. He entered the Jesuit order at an early age, and for some time taught

permission, and within which no women might come. In certain religious orders there were double monasteries for men and women side by side, such as at Whitby, the abbess usually ruled over both monasteries.

The government, of course, depended on the religious rule of the community. Among the *Benedictines* the abbot held office for life and ruled practically as absolute monarch, while under him the cantor or precentor, sacrist, cellarer, guest-master, and novice-master saw to the various departments of the monastery. Among the *Dominicans*, however, the form of government was different. Superiors and officials were all elected, usually for a term of three years. Even when in office, they were simply an executive, and had no legislative powers.

MONASTICISM is the general name given to an organized life of asceticism; it includes the further idea of a withdrawal from the world and a dwelling apart; it arose in the East at an early date. Its purpose is generally union with God by intelligence and will, and the means self-denial. The monastic vows were three in numbers—poverty, chastity, and obedience. Expression of this ideal has been given in two different ways—in the solitary life of the hermit, or the more social existence of the monastery.

MONASTIR, or MONASTIR BITOLIA, tn., Jugo-Slavia (Serbia), 137 m. by rail W.N.W. of Salonica (41° 2′ N., 21° 21′ E.); Formerly belonged to Turkey, but by the treaty of Aug. 10, 1913, which concluded the Balkan Wars, it fell to Serbia. Captured by Bulgars in Oct. 1915; recaptured by the French (Nov. 10, 1916). Pop. 45,000 (two-thirds Mohammedans).

MONAZITE, anhydrous phosphate of cerium, widely distributed, small amounts being found in gneisses and granites; obtained chiefly from N. Carolina and Brazil; used in making thoria for manufacture of incandescent gas mantles.

MONCEY, BON ADRIEN JEANNOT DE (1754-1842), marshal of France, 1801; Duke of Conegliano, 1808; fought in wars of Fr. Revolution, rising to be commander-in-chief in Spain, 1793-94; commanded in Peninsular War and invasion of France, 1814.

MONCK or MONK, GEORGE, 1ST DUKE OF ALBEMARLE (1608-70), Eng. soldier and sailor; saw much foreign service prior to Civil War; was for some years in Dutch army and led forlorn hope at Breda (1637); was a royalist in early stages of Civil War, but after capture by Fairfax and imprisonment (1644-46) accepted Parliamentary command in Ireland; distinguished himself as lieut.-general under Cromwell at Dunbar (1650), and as admiral against Dutch (1653); was instrumental in bringing about restoration of Charles II. (1660), who created him Duke of Albermarle. As admiral of the fleet defeated Dutch (1666).

MONCTON (46° 5′ N., 64° 10′ W.), city, on Petitcodiac, New Brunswick, Canada; stoves, cotton and woolen goods. Pop. 14,000.

MOND, LUDWIG (1839-1909), Brit. chemist of Ger. birth; did much to develop chemical industry, particularly by introduction of ammonia - soda process of manufacturing sodium carbonate, and later by production of 'producer gas' from useless slag and its distribution for power purposes; was joint-discoverer with Langer and Quincke of nickel carbonyl. He founded the Davy-Faraday research laboratory of the Royal Institution, and bequeathed to the nation some of his fine Ital. pictures.

MONDAY (*moon-day*; Anglo-Saxon, *Monondaeg*) the second day of week, formerly sacred to the moon.

MONDOVI (44° 22′ N., 7° 48′ E.), town, Cuneo, Italy; bp.'s see and cathedral; silk, pottery. Pop. 20,000.

MONET, CLAUDE (1840), Fr. impressionist and open-air landscape painter; studied under Gleyre, but was mainly influenced by Corot, Millet, Manet, Degas, and Turner. Among his works are views of Argenteuil, of Vetheuil, of Pourville, cliffs of Etretat, cathedrals, and *Le Bassin de Numpheas.*

MONEY, commodity used by the sanction of law or custom in any community as the medium of exchange. Only tribes in a very primitive state of existence engage in barter; with civilization comes in the need of some product that will serve as a common instrument of exchange. Cattle and sheep were quite early used as money by Greeks and Romans. Corn and other cereals have been widely employed. Shells, oil, rock-salt, and a host of articles could be named which have at various times and places proved acceptable as money. But metals have long and most widely been recognized as the most satisfactory medium of exchange. Iron, copper, tin, and lead have been thus used, and copper, though it is now in civilized countries only 'token-money,' was in general use in Europe in the Middle Ages. Silver and gold, commonly called

the precious metals, have won the first place in the world as money (*currency*), chiefly through their many properties—their highly concentrated value, their durability, and their numerous uses in art and industry. See COINS.

If the first and most important function on money is to be a common medium of exchange, its second use is to furnish a unit of account of all commodities for sale, and its use in this way depends on its acceptance as the medium of exchange.

The value of money depends, as in the case of other commodities, on the law of supply and demand—for gold and silver as mediums of exchange and as common denominators of value are themselves commodities of intrinsic value. When gold is plentiful the prices of other goods are high, and when gold is scarce prices are low in countries where gold is in constant demand as a medium of exchange.

With the introduction of credit, money also becomes the standard of deferred payments. It has been maintained by certain economists that bills of exchange are money, but the objection still holds, as in the case of checks, that such instruments cannot find general acceptance, and it would, perhaps, be truer to say that bank drafts and bills of exchange limit the operation of money, and partake, by the mutual cancelling of debt they accomplish, of barter. Others would contend that the definition of money needs to be extended to cover checks and bills of exchange. There is, in fact, no satisfactory short definition of the term.

As its common acceptance is essential, the coining of money is always kept in the hands of the government in civilized countries, and the manufacture of coins by private persons is a criminal offense that only in comparatively recent years has ceased to be punished by death. The gravity of coining can easily be understood. Not only is it an infringement of the rights of government, injurious to the revenue, but when once any serious number of bad coins are in current use, confidence is shaken. Possession of such coins inflicts serious harm on innocent persons who have taken them without detecting the alloy and cannot dispose of them, and the knowledge that bad money is in circulation breeds mutual suspicion, destroys freedom in exchange, and sheds uncertainty on the prices of all commodities (See COINING). When credit is general it is of utmost importance that money should have a stable value, and though gold and silver may escape the operations of the coiner, there is a danger that government itself may work mischief by the issue of paper money. Any departure from the gold standard—(*i.e.*,) the requirement that notes must be converted into gold on demand—makes an over-issue of notes possible. The World War has furnished examples of over-issue and a rise in prices with all its consequences. As gold and silver are each under their own laws of supply and demand, it has been proposed that they shall have a fixed ratio to one another. Bimetallism is the name given to its proposal for fixing the gold-price of silver and the silver-price of gold. See COINAGE, AMERICAN; COINS, FOREIGN VALUE OF.

MONEY, MAKING OF. See COINAGE.

MONFALCONE, fort. tn., Görz and Gradisca, Italy (45° 48′ N., 13° 32′ E.), formerly Austria, 10 m. S.W. by S. of Görz; sea-bathing and mineral waters. During World War, Ital. destroyers shelled its shipyards and airmen frequently bombed it. Captured by Italians (June 6, 1915); lost after the Caporetto affair (Oct. 24, 1917). Became Italian by Treaty of Peace (signed July 16, 1920). Pop. *c.* 5,000.

MONFORTE (42° 35′ N., 7° 27′ W.), town, Lugo, Spain. Pop. 13,200.

MONGE, GASPARD (1746 - 1818), Fr. mathematician; *b.* Beaune; ed. there, and at Lyons; invented descriptive geometry, dealing with the representation of 3-dimensional objects by drawings in one plane; prof. of Math's (1768) and of Physics (1771) at Mézieres prof. of Hydraulics (1780) at the Lyceum in Paris.

MONGHYR. — (1) (*c.* 25° N., 86° 15° E.), district, Bihar and Orissa, India; area, 3920 sq. miles. Pop. 2,075,000. (2) (25° 22′ N., 86° 30′ E.), town, capital of above; manufactures iron goods. Pop. 36,000.

MONGOLIA, region, Central Asia (*c.* 37° 30′-53° 30′ N., 82° 30′-126° 30′ E.); nominally subject to China; bounded N. by Siberia, E. by Manchuria, S.E. and S.W. by China proper, N.W. by Siberia; three divisions: (1) Central Mongolia, composed of stony and sandy desert passing into steppes, commonly called Gobi; (2) N.W. Mongolia, which includes various mountain ranges, including Tannu, Khanghai, and Great Altai Mts.; (3) S.E. or Inner Mongolia, formed of the Great Khingan and Inshan chains. Principal rivers are Black Irtish, Yenisei, Selenga, Orkhon, Kerulen, all in northern half; Hwang-ho drains a corner of S. Lakes include Kossogul, Ubsa Nor, Durga Nor. Climate highly continental, and ex-

tremely invigorating. Livestock is raised. Mongolia produces salt, graphite, silver lead, sulphates; one coal mine is worked. Mongolia is inhabited chiefly by Mongols, who for most part profess Buddhist religion. Inner Mongolia remains loyal to China, but Outer Mongolia, including Khalkha and Kobdo (except Alteir), was autonomous state. But China declared this autonomy null and void and cancelled its independence. Area, 1,367,600 sq. m.; pop. 1,800,000.

MONGOLS, a great division of mankind, which, from its original home in Asia, has spread into Europe, Africa, and the Pacific Islands. Straight, coarse hair (plentiful on the head and scanty on the body), yellowish skin, brachycephalous headform, prominent cheek-bones, roundish face, and small black eyes are characteristic of the Mongolian. The stature is medium, and in the matter of intellectual development there is as much variety as among the white peoples; on the one hand there are the lowest tribes of Siberia and the semi-civilized inhabitants of Central Asia, and on the other the great and ancient civilization of China.

The word Mongol is now by general consent derived from *mong*, meaning 'brave' or 'bold.' All the early history of the race is at persent hopelessly mixed up with myth. But we know that in the plains watered by the Kerulon, the Argun, and the Upper Nonni, the M. merge into history as strenuous and intrepid fighters, and that Jenghiz Khan was born and made his capital at Karakorum in that region. In the XII. cent. A.D. a confederacy of Mongol tribes, ruled by an ancestor of Jenghiz, existed, but it was Jenghiz Khan who established the supremacy of the M. in Central Asia. Then came the conquest of China by his sons, 1234 A.D.; and the overrunning of Russia, Hungary, and Armenia by grandsons. But the M. had no capacity for settlement or colonization, and their conquests were conspicuous for savage atrocities. Kublai Khan established a dynasty in China, which ruled from 1294 to 1368 A.D., and then the M. were expelled from China and crushed by the Chinese, and their country was absorbed. At the same time, in the west of Asia and Eastern Europe the M. formed the Kipchak states, whose chief was Toktamish. He in his turn was overthrown by a greater Tartar chief, Tamerlane, and in 1550 the Russians conquered their Mongol enemies.

The Mogul (or Mongol) Empire in India was founded *c.* 1520 by Baber, a descendant of Jenghiz Khan. Another large area of Mongol conquest—Persia, Georgia, Armenia, and much of Asia Minor—was ruled by the descendants of Jenghiz Khan, from 1253 till 1335 A.D., when the Mongol monarchy in Persia passed away with the death of Abu Said. Some of these Persian monarchs were friendly to Christianity, anxious for European culture, and gave considerable encouragement to learning and to the arts.

The total population of M. under Chin. rule is now estimated at 3,000,000, and is divided into tribes governed by military chieftains. Buddhism, introduced by Kublai Khan, is the common religion, and the *Kutuktu*, or Living Buddha of Mongolia, ranks next in importance to the Grand Lama of Tibet. The language of the M. first reduced to writing by Jenghiz Khan, belongs to the Ural-Altaic family, and is akin to the Manchu and Korean tongues. Horse-breeding and cattle-raising are the chief industries of the people, and hunting produces furs, skins, and deer horns for trading purposes. There are no manufactures, but the large transit trade from Peking to Siberia gives considerable employment, for the caravans have to be conducted and the roads maintained. The M. possess few towns or cities, for they are still in the main a race of tent-dwellers.

MONGOOSE, MUNGOOSE, or **ICHNEUMON,** a genus of small weasel-like animals, common in many parts of Asia, especially India and Africa. The largest species is the Egyptian Ichneumon. The common Indian M. is tawny or grey in color, and about 17 in. long, excluding the tail, which is about 14 in. long. It is very voracious, and fights and kills even large and poisonous snakes with the utmost agility and daring, and for this service has been introduced into the W. Indies and other countries. It is readily tamed and makes a delightful though mischievous pet.

MONGREL, properly a hybrid between two varieties of a species.

MONICA (332-87), was the mother of St. Augustine. She was the wife of Patricius, a pagan citizen of Tagaste, and converted both her husband and son to Christianity.

MONISM, strictly, any system which regards the universe as the expression of a single principle (cf. Pluralism); but recently applied to the doctrine of the material interaction between brain and nervous system as the outer expression of an inner unity of consciousness.

MONITOR, the name for a number of lizards which include some of the largest forms. They are widely distrib-

uted throughout the eastern hemisphere, and their habitat varies from dry sandy spots far away from the water to the marshy banks of rivers. The Nile Monitor (*Varanus niloticus*) is about 6 ft. long, with a long head and small rounded nostrils. An even larger species is the Ocellated M. of China and Siam. It preys on birds and smaller lizards, and if attacked, defends itself fiercely.

MONITOR, one of the first ironclad warships used by the American navy and constructed in 1861 for service in the Civil War. It was the forerunner of a class of vessels, known by this name, whose construction followed its general lines, namely, a revolving armored gun-turret, low freeboard and light draft, and were used for coast defense. The original *Monitor* was built for the federal government under the direction of John Ericsson (*q.v.*) and achieved immediate fame on its maiden trip in March, 1862, from Greenpoint, L. I., to Hampton Roads, Va., where it met and fought the Confederate *Merrimac* another ironclad. It was the first action between ironclads, and ended in the *Merrimac* suffering considerable damage while the *Monitor* proved invulnerable to her powerful guns. The *Merrimac* had been playing havoc with the federal fleet of wooden ships in the Hampton Roads, when the *Monitor* appeared and saved the surviving craft from destruction. The *Merrimac's* achievement in almost wiping out the Federal vessels, while untouched by their fire, sealed the doom of wooden ships for fighting purposes. The *Monitor* had been too hurriedly constructed to be of much service after this signal victory over the Confederate raider. The following December she floundered off Cape Hatteras with much loss of life.

MONK. See MONASTICISM.

MONKEYS. See under PRIMATES.

MONKS, BLACK. See BENEDICTINES.

MONMOUTH, a city of Illinois, in Warren co., of which it is the county seat. It is on the Minneapolis and St. Louis, Rock Island, Southern and Burlington railroads. Its industries include the manufacture of sewer pipe, cigars, agricultural implements, and crockery. It is the seat of Monmouth College, and has a library and business college. Pop. 1920, 8,116.

MONMOUTH, BATTLE OF, a victory gained in 1778 at Monmouth Court House N. J. by Americans under Washington over the British under Clinton.

MONMOUTH COLLEGE, situated in Monmouth, Illinois, is a co-educational institution conducted by the United Presbyterian Church and founded in 1856. It has preparatory, music, art and graduate departments. There were 467 students and 27 teachers in 1922.

MONMOUTH, JAMES SCOTT, DUKE OF (1649-85), putative *s.* of Charles II.; cr. duke, 1663; m. heiress of Buccleuchs, and became Duke of Buccleuch, 1665; antipopery agitation became so strong that York secured M.'s exile, 1679; he returned and refused to quit England, 1679; openly supported by exclusionists headed by Shaftesbury; imprisoned, 1682; released, took part in Rye House Plot, and escaped to Holland, 1683; invaded England, 1685, conjointly with Argyll's invasion of Scotland; defeated at *Sedgemoor,* and executed by James II.

MONMOUTHSHIRE (51° 43'N.; 3° W.), small county, S.W. England; suffered from Danish invasions, IX-X. cent's; included in Wales till 1536; during Great Civil War Raglan Castle was successfully besieged by Roundheads. M. has area *c.* 600 sq. miles; surface flat along coast, elsewhere hilly, rising in N. and N.W. to heights of nearly 2000 ft.; drained by Usk, Wye, and other streams; county town, Monmouth; grazing, wheat, orchards. M. contains ruins of many Norman castles, and of Tintern and Llanthony Abbeys. Pop. of administrative county, 1921, 358,331.

MONOCHORD, an appliance invented by Pythagoras for studying musical intervals by means of a movable bridge under a single string stretched over a sound-board by a weight. From it the musical instrument of the same name, a sort of one-stringed guitar, was evolved. The 'nun's fiddle' was also derived; and the clavichord was an application of the same principle, manipulated by a keyboard

MONOCOTYLEDON, a plant with one cotyledon or seed leaf (*e.g.* wheat), as distinguished from a Dicotyledon (*e.g.* bean). This distinction is the main basis of two great divisions of the Angiosperms, the group which comprises the majority of all flowering plants. In the M. the radicle or rudimentary leaf usually remains undeveloped, but throws out roots from its crown. In the Dicotyledon, it usually elongates and forms a primary leaf. The stem of Ms. has no central pith or separable bark, and the whorls of the perianth occur in threes. But, as a rule, the most visible

and easily recognized distinction is that the leaves are parallel veined except in a very few cases, notably the black bryony, arum, and herb-Paris. Ms. are separated into three main divisions: (1) Spadicifloræ, flowers arranged on a spadix and frequently enclosed by a large spathe (*e.g.* arum); (2) Petaloidæ, with petaloid perianth (*e.g.* lily or daffodil); (3) Glumiferæ, perianth absent and flowers borne in spikelets in the axils of scales or glumes (*e.g.* sedges or grasses.)

MONOGENESIS, the direct development of an embryo similar to the adult; descent from a single (hermaphrodite) parent; the theory of the origin of all organisms from a single cell.

MONOGENIST, in anthropology, opposed to *polygenist*, indicates a believer in the theory of *monogeny*—that all races of mankind have arisen from one primitive stock, and primarily from a single pair; or in a general way, one who holds the theory of *monogenesis*.

MONOGRAM, a device by which two or more alphabet letters are interlaced, usually for the abbreviation of a name.

MONOGRAPH, a term applied to the exhaustive and detailed treatment of a single portion or branch of any art or science. The word is limited somewhat to books of moderate dimension.

MONOLITH, a pillar or other large object cut from a single block of stone. The great obelisks of Egypt are the best known examples.

MONOMANIA. See under INSANITY.

MONONGAHELA, a river rising in West Virginia and flowing north to Pittsburgh, Pa., where it unites with the Allegheny to form the Ohio.

MONONGAHELA CITY, a city of Pennsylvania, in Washington co. It is on the Pittsburgh and Lake Erie, and the Pennsylvania Railroad, and on the Monongahela River. It is the center of an important coal, natural gas and petroleum region and its industries are connected chiefly with mining. It was the first city in the United States in which carborundum was made. It has foundries, machine shops, paper mills and flour mills. Pop. 1920, 8,688.

MONOPHYSITES (Gk. 'one nature'), term applied to those who believed that because Christ was one person He must therefore have had only one nature, though a composite one. The M. sect arose after the Council of Chalcedon, 451, and played an important part in the ecclesiastical, and even the political, struggles of the time.

MONOPLANE. See AERONAUTICS, FLIGHT.

MONOPOLI (40° 57′ N., 17° 18′ E.), seaport town, on Adriatic, Bari, Italy; exports wine, fruits. Pop. 24,000.

MONOPOLY, the exclusive privilege granted or guarded of selling any commodity, or making, using, or working anything; granted frequently by Elizabeth and found very injurious; abolished, 1623, by Statute of Monopolies; exists now by Letters Patent.

The modern form of M. is the *Trust* system, in which a group of capitalists contrive to acquire partial or complete control of an industry. The United States Congress has attempted to check the movement by Anti-Trust legislation. There are a few foreign government m's, such as the tobacco and match industry in France.

Modern Socialists affirm that by creating government m's out of all the leading industries profits would be increased, a great amount of waste obviated, and a surplus thus produced which might be devoted to social amelioration. See TRUSTS.

MONO-RAIL. See GYROSCOPE.

MONOSES. See CARBOHYDRATES.

MONOTHEISM. See THEISM.

MONOTYPE. This name is applied to a machine which casts type one letter at a time, as distinguished from the Linotype, which casts a whole line at a time.

The first type setting machine of Dr. Church (1822) was the forerunner of many successful varieties. The Langston is probably the best representative of the monotype machine. This machine is comprised of a keyboard and a type casting machine. The keyboard section perforates a paper tape in a characteristic manner. This tape is then fed to the type casting machine, where an intricate mechanism interprets the perforation of the tape and controls the casting machine. Thus, depressing a certain key on the keyboard perforates the tape in such a manner that the type casting machine will cast the letter corresponding to the key pressed.

The type is cast in a mold, partially formed of a bronze matrix of the character desired. The type metal is kept melted by a flame of some sort and is pumped into the mold. The type, automatically ejected from the mold and cooled by a blast of air, is trimmed before it is delivered to a channel block where the lines are assembled. Both

keyboard and casting machine are actuated by compressed air.

MONREALE (38° 5′ N., 13° 17′ E.), town, Palermo, Sicily; near M. occurred the great massacre of Fr. settlers, the Sicilian Vespers, 1282. Chiefly famous for wonderful Norman cruciform cathedral, dating from 1170; has remains of Benedictine monastery. Archi-episcopal see. Pop. 24,500.

MONRO, SIR CHARLES CARMICHAEL (1860), Brit. soldier, entered the army in 1879. During World War he commanded the 2nd Division in France (1914), and was appointed to command of 3rd Army (1915). In Oct. 1915 he succeeded General Sir Ian Hamilton in command of Mediterranean Expeditionary Force, carrying out, in conjunction with Admiral Wemyss, the memorable evacuation from Suvla Bay. He was commander-in-chief of the forces in India from 1916 until Oct. 1920.

MONROE, a city and the cap. of Ouachita par. Louisiana, on the Ouachita R., 76 m. W. of Vicksburg, Miss. It has a large trade in cotton, and manufs. cotton compresses, cottonseed oil, molasses, and bricks. Pop. 1920, 12,675.

MONROE, a city of Michigan, in Monroe co., of which it is the county seat. It is on the Lake Shore and Michigan Southern, the Detroit and Toledo, and the Pere Marquette railroads, and on the Raisin River. It is an important industrial city and has foundries, machine shops, nurseries, tanneries, lumber mills, paper mills etc. There is a public library, high school and academy. After the battle of Raisin River, in 1813, between the American forces and the English and Indians, several hundred American prisoners were massacred here. Pop. 1920, 11,573.

MONROE, FORT (or Fortress), U.S. military post covering an area of 282 acres at Old Point Comfort, Virginia, guarding the mouth of the James river, which flows out south of Chesapeake Bay. It is 11 miles northeast of Norfolk and with Fort Wool commands the entrance to Hampton Roads (*q.v.*). It is the headquarters of the defenses of Chesapeake Bay and has a coast artillery school.

MONROE, HARRIET, author; *b.* in Chicago, Illinois. Graduate of an academy in Georgetown, D.C., and took a degree at Baylor University, Waco, Texas in 1920. Wrote a poem in 1891 for the Chicago Exposition. In 1892 a poem written by her was read at the 400th anniversary, of the discovery of America. The founder and editor of *Poetry.* Author of *Valeria and Other Poems,* 1892; *The Columbian Ode,* 1893; *John Wellborn Root*—A Memoir, 1896; *The Passing Show*—modern plays in verse 1903; *You and I,* (poems), 1914. Edited, *The New Poetry,* an Anthology, 1917; (with Alice Corbin Henderson).

MONROE, JAMES (1758 - 1831), fifth President of the United States; *b.* Westmoreland county, Va.; *d.* New York City. He was educated at William and Mary College, but ceased his studies when the Revolution began and joined (1776) a Virginia regiment as a lieutenant. He took part in the battles of Brandywine, Germantown and Monmouth (1777-79), with the Continental Army, but later confined his military work to the defense of his own state as a Volunteer. He studied law under Jefferson, then governor of Virginia, after the war, entered the Virginian legislature, was a member of the Congress of the Confederation (1783-86), and represented his State in the ratification of the federal Constitution in 1788. Two years later he became a U.S. Senator as an anti-federalist. In 1794 he was appointed Minister to France, but was recalled in 1796. He served as governor of Virginia from 1799 to 1803, and again went to France as an envoy and took part in acquiring the Louisiana Purchase. Re-elected governor of Virginia in 1811, he resigned that post shortly afterwards to serve as Secretary of State, then of War, under Madison. The Republican Party elected him President in 1816, and he held office for two terms, retiring in 1825. His administration was marked by the acquisition of Florida from Spain, the Missouri Compromise, recognition of the independence of the new Spanish-American republics and the promulgation of the Monroe Doctrine (*q.v.*).

MONROE, PAUL (1869), university professor; *b.* at North Madison, Indiana. Graduated from Franklin College in 1890. From 1895-1897 at University of Chicago was fellow in Sociology. At Teachers College, Columbia University has been instructor of History, 1897-1899, adjunct professor history of education, 1899-1902, and professor since 1902, director 1915, of the School of Education. At the University of California, in 1905 a lecturer in education. At Yale College, 1906-1907. Author of *Source Book in the History of Education for the Greek and Roman Period,* 1901; *Thomas Platter and the Educational Renaissance of the Sixteenth Century,* 1904; *A Text Book in the History of Education,* 1905; *Brief Course in the History of Education,* 1907; *Principles of Secondary Education,* 1914; Has been

editor of many encyclopedias also editor-in-chief of Cyclopedia of Education. Editor *Brief Course Series of Educational Texts, Home and School Series*, 1914. Reported on condition of school systems in the Philippine Islands to the Bureau of Insular Affairs, War Department.

MONROE DOCTRINE. The preservation of American territory against European acquisitions, and later against control of Latin-American republics by foreign powers. The doctrine was first enunciated by President Monroe in his message to Congress December 2, 1823. Spanish colonies in Central and South America had declared independence which had been recognized by the United States. Spain appealed to the Holy Alliance, Russia, Prussia, Austria and France to help save her colonies. The Czar of Russia put out a claim to the Pacific Coast of North America, exclusive rights to the North Pacific and Bering Sea. President Monroe said in his message 'The occasion has seemed proper for asserting as a principle in which rights and interests of the United States are involved, that the American Continent by the free and individual independent condition which they have assumed, are henceforth not to be considered as subjects for future colonization by any foreign power . . . . Declare that we should consider any attempt on their part to extend their system to any part of this hemisphere as dangerous to our peace and safety.' The Monroe Doctrine has since been appealed to by presidents and Congress when Europe interfered with Latin-America. Thus Secretary Olney, in 1895, demanded that Great Britain arbitrate the Venezuela boundary dispute. In 1905 Roosevelt declared the United States were the police of the Western Hemisphere. In August, 1912, the U.S. Senate extended the Monroe Doctrine to include Asiatic interests, when Japan, or a Japanese syndicate, attempted to secure Magdalena Bay, Southern California. Under Roosevelt and Taft the United States assumed a protectorate over Cuba, Santo Domingo, Panama and Nicaragua.

MONROVIA, the cap. of Liberia, W. Africa, at the mouth of the St. Paul R., on the Atlantic coast. It exports coffee, palm-oil and palm-nuts, dye-woods, and rubber. Pop. 8,000.

MONS (Flem. *Bergen*), city, cap. Hainaut, Belgium, on the Trouille, 35 m. S.S.W. of Brussels (50° 27′ N., 3° 56′ E.); center of the Borinage, the chief coal-mining dist. of Belgium (annual output before the war, 12,000,000 tons); focus of main roads from Brussels, Binche, Charleroi, Valenciennes, and Maubeuge; Paris-Brussels ry. passes through it; junction point of Mons-Condé canal with Canal du Centre, which connects former with the Charleroi canal and the Sambre. Mons-Condé canal also (15 m.) gives access to Scheldt. History goes back to time of Cæsar; cathedral (completed in 1687); hotel de ville; belfry, 1650; school of mines. Industries include engineering, cotton spinning, iron founding, and glass making. Pop. 25,000.

Mons was occupied by the Germans during the invasion of Belgium in 1914, and was the center of the first encounter between the German armies and the combined English and French forces on August 14. The overwhelming power of the German forces obliged the Allied armies to retreat, and this famous retreat from Mons was one of the most important features of the first year of the war. It terminated in the final stand of the English and French armies on the Marne and was followed by the battle of the Marne. See MARNE, BATTLE OF; WORLD WAR.

MONSON, SIR WILLIAM (*c.* 1569-1643), Eng. admiral; served against Spain under Elizabeth; admiral of Narrow Seas, 1604; vice-admiral, 1635; author of *Tracts*; historically important.

MONSIEUR, a title formerly used to designate the eldest brother of the king of France. In common use it answers to the English and American Sir and Mr.

MONT GENEVRE (44° 55′ N., 6° 50′ E.), pass, Cottian Alps, between Italy and France.

MONT ST. MICHEL (48° 40′ N., 1° 30′ W.), granite island off coast of Normandy, in Bay of St. Michel; rises 240 ft. above surrounding sands, and is reached by causeway; summit crowned by old town and Benedictine monastery, originally founded, 966.

MONTAGNARDS, or MONTAGNE. The name given to the extreme Democratic party in the first French Revolution. They were so-called because they occupied the highest benches in the National Convention, while their opponents, the Girondists, sat on the floor of the house. The party included both Jacobins and Cordeliers, and its principal members were Danton, Marat, Robespierre, St. Just, and Collot d'Herbois, the men of 'the Reign of Terror'. The name was temporarily revived in 1848.

MONTAGU, LADY MARY WORTLEY (1689-1762), Eng. letter-writer; pioneer advocate of inoculation for smallpox. During her travels Lady Mary

wrote her celebrated *Letters* descriptive of Eastern life.

MONTAGU, RICHARD (1577-1641), bp. of Chicester, 1628, Norwich, 1638.

MONTAGUE, a town in Franklin co. Massachusetts, 72 m. W.N.W. of Boston. Pop. 1920, 7,675.

MONTAIGNE, MICHEL DE (1533-92), Fr. essayist; *b.* in castle of Montaigne between Castillon and Bergerac; after schooling at Bordeaux studied law and in 1554 was made Councillor in Parliament of Bordeaux; resigned his post *c.* 1572, and retired to Montaigne, where he began to write his *Essais*; traveled through Switzerland, Germany, Italy, whence he was recalled to be Mayor of Bordeaux (1582-86).

MONTALEMBERT, CHARLES FORBES RENÉ DE (1810-70), Fr. orator and historian; *b.* in London during Fr. Revolution; sought to unite Liberalism and Catholicism until 1857 when he retired from politics; wrote *St. Elizabeth of Hungary*, 1836; and *Monks of the West*, 1860-67.

MONTALEMBERT, MARC RENÉ, MARQUIS DE (1714-1800), Fr. military engineer and author; *b.* Angoulême; served in campaigns in Germany, Italy, and Bohemia; wrote on fortifications, and elected to Academy of Sciences.

MONTANA, one of N.W. states of U.S. (46° 45′ N., 110° W.), bounded N. by Canada, E. by N. and S. Dakota, S. by Wyoming, W. by Idaho; surface generally consists of undulating prairie, rising westward to Rocky Mts., main ridge of which reaches nearly 12,000 ft., drained by Columbia and its tributaries in W., Missouri and its affluents, most important of which are Milk and Yellowstone, in E. Cap. is Helena; large towns, Butte, Great Falls, Billings, Missoula, Anaconda. See MAP, U.S.

Agriculture is rendered possible by means of irrigation; livestock raised; cereals grown, fruit widely cultivated; important deposits of copper, gold, silver, lead—output of copper especially being very large; coal, iron, antimony also found. Slopes of Rockies yield timber. Chief industries are flour milling, lumbering, copper smelting. Railway mileage is nearly 5,000.

Trading stations and missions were established after 1806; the western portion was at different dates included in Oregon, Washington, and Idaho; eastern portion was part of Louisiana Purchase, and was subsequently included in Missouri, Nebraska, Dakota, and Idaho in succession. In 1861 discovery of gold led to great influx of miners, and Montana was organized as separate territory in 1864; early years marked by frequent hostilities with Indians, who were ultimately subdued in 1877; admitted as state to Union (1889).

Executive power is vested in governor, assisted by six state officials; legislative authority vested in senate of 43 members and house of representatives of 97 members, elected by popular vote. Woman suffrage adopted (1914). State divided for local administrative purposes into 29 counties, and is represented in Federal Congress by two senators and two representatives.

Education is free and obligatory; state has a univ. at Missoula, and technical colleges. Area, 146,997 sq. m., of which 796 sq. m. are water; pop. 548,889.

MONTANA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, a non - sectarian and co-educational institution situated at Bozeman, Montana, and affiliated with the University of Montana. It was founded in 1893 and teaches agriculture. engineering, applied science, household and industrial arts, home economics, music and vocational education. An agricultural experiment station of 380 acres is connected with the college. In 1922 there was a student roll of 708 and a faculty of 67 under the direction of A. Atkinson.

MONTANA STATE UNIVERSITY. Originally the University of Montana. A co-educational institution opened at Missoula, in 1895. In 1892 Congress gave 46,500 acres of ground for the University, 31,668 acres of which have been sold for $539,715. The income from all sources is about $300,000. In addition to the usual high class college courses it mantains professional schools in forestry, journalism, law, music, and pharmacy. A biological station is located at Flathead Lake. The University is open all the year. President, C. H. Platt. Students 1205. Teachers 75. (1922-1923).

MONTANISM, the name given to a religious movement of the second Christian cent., after its founder, Montanus. The center of his activity was Phrygia, in Asia Minor, and he believed himself to have a prophetic calling. The cause of the movement was the secularism of the Church and the laxity, in some places, of Church discipline. Some Montanists were excommunicated, others voluntarily separated from the Church. Among converts was Tertullian.

MONTARGIS (48° N., 2° 43′ E.), town, Loiret, France; at junction of Loing and Vernisson; ruined castle. In Charles VI.'s reign, the 'dog of M.' picked out and overcame in combat Macaire, its master's assassin. Pop. 13,500.

MONTAUBAN (44° 1′ N., 1° 22′ E.), town, Tarnet-Garonne; France; Prot. stronghold, Huguenots were besieged here in 1562 and 1621; possesses Prot. Theological Coll.; formerly fortified; episcopal see, fine cathedral; manufactures woolens. Pop. 28,900.

MONTAUK POINT, the extreme eastern point of Long Island, New York. It has a storm lighthouse, which is visible for 19 miles. In 1898, during the Spanish-American War, Montauk Point was used as a place for recuperation for sick and wounded soliers.

MONT BLANC. See BLANC, MONT.

MONTCALM, LOUIS JOSEPH, MARQUIS DE (1712-59), Fr. soldier; commander in Canada, 1756; captured Fort William Henry; held Ticonderoga against General Abercrombie's sieged commander at Quebec, he fell fighting against Wolfe on the Plains of Abraham.

MONTCEAU - LES - MINES (46° 38° N., 4° 20′ E.), town, Saône-et-Loire, France; coal mines, ironworks. Pop. 27,000.

MONT CENIS. See CENIS, MT.

MONTCLAIR, a town of New Jersey, in Essex co. It is on the Erie and the Lackawanna railroads. It is essentially a residential community and is situated in the Orange mountains which has an average elevation of about 300 feet. There are many handsome private residences and there is a hospital, military academy, State Normal School, art museum, and a public library. Pop 1920, 28,810.

MONT-DE-MARSAN (43° 56′ N., 0° 29′ W.), town, Landes, France, at confluence of Midou and Douze; resin, oil. Pop. 12,000.

MONT-DE-PIETÉ (Lt. *Monte di Pieta*), an establishment where money is lent to the poor at a moderate rate of interest, was founded, to combat the evils of usury, about the middle of the 15th century at Orvieto, 1463, and Perugia, 1467. The first establishment in Paris was opened in 1777, suppressed during the Revolution, but later restored as a national undertaking with the right to charge 9 per cent. on all loans to pay working expenses; any surplus gain goes to public charities.

MONTDIDIER, tn., Somme, France (49° 39′ N., 2° 33′ E.), on the Arve, 22 m. S.E. of Amiens. Served as prison of Lombard king Didier, hence its name, given to it by Charlemagne. Two ancient churches, palais de justice, hotel de ville; remains of ramparts and chateau. Birthplace of Parmentier (statue), who introduced growing of potatoes into France (17th cent.). Captured by Germans during great spring offensive of 1918; retaken in Allied advance (Aug. 10, 1918). Pop. 4,600.

MONTEBELLO, a vil. in the prov. of, and 10 m. S.W. of the city of Vicenza, Italy. The Austrians were defeated here in 1796 by General Bonaparte, and in 1805 by the Italians under Prince Eugene de Beauharnais. Pop. 4,700.

MONTE CARLO. See under MONACO.

MONTE CASSINO (41° 31′ N., 13° 48′ E.), monastery, on hill near Cassinum, Italy; founded by St. Benedict in VI. cent.

MONTE CRISTO (42° 21′ N., 10° 17′ E.), small island of Italy in Mediterranean; ancient *Oglasa.*

MONTEMAYOR, JORGE DE (1520-61), a Spanish poet, *b.* at Montemor-o-Velho, near Coimbra, Portugal. His fame rests on his unfinished pastoral romance, *Diana enamorada,* 1558, (English translation, 1598, by Bartholomew Young). An edition of his works appeared in 1886.

MONTE SANT' ANGELO (41° 43′ N., 15° 57′ E.), town, Foggia, Italy; place of pilgrimage. Pop. 23,000.

MONTECUCCOLI, RAIMONDO, COUNT OF (1609-80), Austrian soldier; brilliant commander in Thirty Years War; shared in protection of Poland and obtained Treaty of Oliva, 1660; inflicted great defeat on Turks at *St. Gotthard,* 1664; defeated Turenne, 1673.

MONTEFIORE, SIR MOSES HAIM (1784-1885), Jewish philanthropist; made fortune on Stock Exchange; sheriff of London, 1837; baronet, 1846; secured better treatment for Jews in Turkey, Russia, Moldavia, and Morocco, and raised various funds for Jewish refugees.

MONTEFRIO (37° 17′ N., 4° W.), town, on Bilana, Granada, Spain; Moorish relics; cotton goods. Pop. 11,500.

MONTÉLIMAR (44° 35′ N., 4° 45′ E.), town, Drôme, France, near Rhône; silk industries. Pop. 13,700.

MONTENEGRO, state, Jugo-Slavia, Europe (42° 40′ N., 19° E.); almost entirely cut off from Adriatic by Dalmatia. Surface is mountainous, rising in center, W., and N., to barren stony plateau, 5,000 ft. above sea-level, and reaching greatest elevation in peaks Durmitor, 8,290 ft., and Kom Kuchi, 8,165 ft. Average elevation is lower on E., and there is a narrow coastal strip, 28 m., with valleys opening off it; drained by Boyana, Zeta, Moracha, and other streams; in S. is Lake Scutari, 134 sq. m., of which eastern half is in Albania. Largest towns are Podgoritza, Niksic; Dulcigno and Antivari, ports; and Cettinje, cap. Climate varies with elevation—warm on coast, cold in mountainous districts; roads are snow-blocked in winter.

Large tracts are uncultivable. In E. are extensive forests of beech, oak, pine, undeveloped owing to lack of roads; sheltered valleys produce tobacco, corn, apples, and other fruits; while along coastal strip and adjoining valleys, grain, grapes, olives, figs, mulberries are grown. Large numbers of sheep, goats, cattle, swine, and horses are raised. Petroleum occurs; minerals little developed. Exports include livestock, cheese, wool, tobacco, hides, olive oil, wine, honey. Railway from Antivari to Lake Scutari was opened in 1908; few roads, and civilization generally is in backward condition. Area, 3,536 sq. m.; pop. 238,423.

Elementary education is free and obligatory, but ignorance is still widespread. There is no state religion; great majority of population belong to Gr. Church; some Roman Catholics and Mohammedans. Inhabitants are warlike race of Slavonic origin.

Montenegro was dependent on Serbia from middle of 13th cent. till defeat of that country by Turkey at Kossovo, 1389; henceforth carried on long struggle against Turks, until Danilo Petrovic freed his realm from the aggressors, 1697 and formed alliance with Russia; several of his descendants supported Russia against Turks; Danilo II. was succeeded in 1860 by Nicholas I., whose reign was also marked by wars which ended in 1878 in defeat of Turkey and recognition by the powers of Montenegrin independence. Nicholas adopted kingly title in 1910; joined Balkan alliance and declared war on Turkey, 1912. Montenegro suffered severely in the World War; in 1915 the country was overrun by the Central Powers and the inhabitants disarmed, practically enslaved, and deported in large numbers. After the Armistice, Nov. 11, 1918, a specially summoned Skupshtina at Podgoritza deposed Nicholas, and declared for union with the new Jugo-Slav state, Nov. 25, 1919. See JUGO-SLAVIA; SALONICA; SERBIA; WORLD WAR.

MONTEREY, a city of California, in Monterey co. It is on the Southern Pacific Railroad, and on Monterey Bay. The city has an excellent harbor and is connected by steamship with other important cities. It has important industries but is essentially a residential community. There are fine facilities for bathing. Monterey is one of the oldest cities in California and contains many interesting examples of Spanish architecture, including two missions and an old custom house. From 1840 to 1845 it was the capital of the Spanish province. Pop. 1920, 5,429.

MONTERREY (25° 34′ N., 100° 20′ W.), town, Mexico; taken by Americans, 1846; episcopal see, has cathedral and episcopal palace; silver mines. Pop. 80,000.

MONTESPAN, FRANÇOISE-ATHÉNAIS DE PARDAILLAN, MARQUISE DE (1641-1707), mistress of Louis XIV.; *dau.* of Duc de Mortemart; *m.* Montespan, 1663; had seven children by king, legitimatized in 1673; soon after lost affection of king; suspected of poisoning rivals; beautiful, witty, patron of letters.

MONTESQUIEU, CHARLES LOUIS DE SECONDAT, BARON DE LA BRÈDE ET DE (1689-1755), Fr. jurisconsult, historian, philosopher. The *Lettres persanes,* 1721, went like wildfire. After M. had consented to publish expurgated edition, he was admitted to Academy, 1728. The *Grandeur et decadence des Romains,* 1734, contained brilliant generalizations on Roman character, but famous *Esprit des lois,* 1748, was marked by deep studies and wide traveling, which M. had undertaken since earlier work.

MONTESSORI, DOTTORESSA MARIA (1870), Ital. educationist; *b.* Rome; first woman to graduate doctor of med. at univ. of Rome, 1894; took great interest in mentally deficient children; her lectures on this subject led to founding of Scuola Ortofrenica, of which she was director, 1898-1900; lectured on pedagogical anthropology at univ. of Rome, 1900-7; first 'House of Childhood' opened under her guidance 1907; she visited U.S. 1913; lectured in England, 1919. Works include *Pedagogic Anthropology,* Eng. trans. 1913; *Montessori Method,* Eng. trans. 1912; *Advanced Montessori Method,* 1918.

The *Montessori System* is a modification of Froebel's kindergarten system.

MONTEVIDEO, SAN FELIPE Y SANTIAGO DE, cap. Uruguay, S.

America (34° 54′ S., 56° 12′ W.). Public buildings include senate house, exchange, town hall, opera-house, univ., various philanthropic establishments. Montevideo is archiepisc. see, and has a modern cathedral; is outlet for all chief productions of Uruguay, and main inlet for imported goods; harbor has exposed and somewhat dangerous roadstead; coaling station; exports jerked beef, wool, skins, grease, horns, cereals; beef-salting an important industry. Settled by Spaniards, 1726; seized by Britain, 1807 but evacuated same year; transferred to Uruguay, 1828, becoming cap. of republic; unsuccessfully besieged by Argentines, 1843, Pop. 1921, 361,950.

MONTEZUMA, name of two Mexican emperors: Montezuma I. (1390-1471) ruled from Atlantic to Pacific. Montezuma II. (1466-1520), the last emperor, by heavy taxation alienated his subjects; tried to buy off Cortes, and became a Span. prisoner; the capital rebelled, Cortes brought out M. to pacify the citizens; a stone wounded the emperor, and soon afterwards he died broken-hearted. See MEXICO.

MONTFERRAT, family of Lombardy; renowned in Middle Ages. William III., Marquis of M., went on Second Crusade, 1147; five sons prominent figures in Holy Land; rivals of Visconti and house of Savoy in Italy.

MONTFORT, SIMON DE, EARL OF LEICESTER (*d.* 1265), statesman and soldier; a Fr. noble; came to England, 1230, becoming Earl of Leicester; opposed demand for subsidy, 1254; joined baronial opposition at Parliament of Oxford, 1258; went to war with Henry, 1263; won battle of *Lewes*, 1264, and established baronial control; slain at *Evesham*.

MONTGAILLARD, JEAN GABRIEL MAURICE ROQUES, COMTE DE (1761-1841), Fr. political agent; spy of first rank, employed by Louis XVIII., the Directory, and Napoleon.

MONTGELAS, MAXIMILIAN JOSEF GARNERIN, COUNT VON (1759-1838), Bavarian statesman; chief adviser of Maximilian Joseph, elector of Bavaria; co-operated in Napoleonic reorganization of Germany; enemy to Ger. unity, but Bavarian patriot.

MONTGOLFIER, JOSEPH (1740-1810) and **ETIENNE** (1745-99), inventors of the balloon. See AERONAUTICS; FLYING.

MONTGOMERIE, ALEXANDER (*c.* 1550-*c.* 1610), Scot. poet; related to the house of Eglinton; wrote much miscellaneous verse, but is remembered only for *The Cherrie and the Slae.*

MONTGOMERY, a city of Alabama, the capital of the State, and the county seat of Montgomery co. It is on the Louisville and Nashville, Western of Alabama, Plant System, Central of Georgia, and other railroads, and on the Alabama River, 95 miles S.E. of Birmingham. Montana is an important industrial city and has developed greatly in recent years, particularly since the opening of the Panama Canal. Its industries include the manufacture of ice, fertilizers, candy, wagons, carriages, soap, paper boxes, etc. It has also large interest in cotton oil machinery and marble. The public buildings of the city include a U.S. government building, Masonic Temple, City Infirmary and many large business buildings. Montgomery was founded in 1817 and was named in honor of the American general Montgomery, who was killed leading the American army against Quebec. It received a city charter in 1837 and ten years later was made the State Capital. In 1861-2 it was the capital of the Confederacy. Pop. 1920, 43,464.

MONTGOMERY.—(1) (52° 34′ N., 3° 10′ W.), county town, near Severn, Montgomeryshire, Wales; ruined fortress. (2) (30° 42′ N., 73° 11′ E.), town and district, Lahore division, Punjab, India. Area of district *c.* 4800 sq. miles; pop. *c.* 464,000. Pop. of town *c.* 6700.

MONTGOMERY, JOHN KNOX (1861), American clergyman and educator. *b.* in Belfast, Tenn. Educated at Enfield College, Ill., Indiana State University, 1879-84, and Xenia Theological Seminary; ordained United Presbyterian clergyman, 1887. Pastorates, Harshaville, O., 1887-90, Sparta, Ill., 1890-95 Cincinnati, 1895-99; Chicago, 1900-01; Charlotte, N.C., 1901-4; President of the Muskingum College since 1904. Editor *Evangel*, 1894-1902. Special preacher in army camps under National War Work.

MONTGOMERY, RICHARD (1736-1775), American soldier; *b.* at Convoy House, near Raphoe, Ireland; *d.* at Quebec. A commissioned officer in the British army he came to America in 1757 and assisted in the siege of Louisburg, 1758. After residing in England for seven years he sold his commission and returning to America settled at Rhinebeck, New York, and became a member of the provincial congress for Dutchess County. One of the 8 brigadiers appointed to the new army of the united colonies he was with a division

that occupied Chamblay, St. John's and Montreal. When Arnold arrived with troops he joined him before Quebec. On December 31, 1775, in an attack on the Cape Diamond bastion, Montgomery was killed. He was interred within the town walls. Congress placed a monumental tablet to his memory in front of St. Paul's New York, and in 1818 his remains were removed from Canada and buried beneath it.

MONTGOMERY, ROBERT (1807-55), Eng. poet and cleric; minister of Percy Street Chapel, London, 1843-55; immortalized by Macaulay's *Edinburgh Review* criticism of his poems.

MONTGOMERYSHIRE (52° 8′ N.; 3° 30′ W.), county, N. Wales; area, 797 sq. miles; hilly on borders, rising to nearly 2500 ft.; produces lead, zinc, slate; manufactures woolens; sheep-grazing on higher ground. Pop. 1920, 51,317.

MONTH (interval of time) is the time which elapses between one new moon and the next. This interval is not constant owing to movements of the moon's orbit relative to the earth. Its mean length is 29·5305887 days. There are five distinct classes of M. 'The sidereal M.,' or the time of a complete circuit, averages 27·3216614 days; the 'anomalistic M.,' or the time of revolution from perigee to perigee, averages 27·554599 days; the 'tropical M.,' or the interval from one vernal equinox to the next, average 27·32158 days. The average 'nodical M.;' or the interval from a node to a similar node, is 27·2122222 days; the 'common or synodic M.' is the interval 29·5305887 days noticed above.

MONTHOLON, CHARLES TRISTAN, MARQUIS DE (1782-1853), Fr. commander; *b.* Paris; served with Napoleon and accompanied him to St. Helena; subsequently imprisoned with Louis Napoleon at Ham; wrote *Recits de la Captivite de Napoleon.*

MONTI, VINCENZO (1754-1828), an Italian poet, *b.* at Fusignano, near Ferrara. He was professor of eloquence at Pavia during the French republic, and during the empire historiographer for Italy at Milan, and gained him a high reputation. His other chief works were *Bardo della Selva Nera,* a eulogy of Napoleon; *Cantica,* a political poem; a translation of Homer's *Iliad,* and *Proposta di alcune correzioni ed aggiunte al vocab. della Crusca,* an attack on the pedantry of the Cruscan dictionary. He also wrote the tragedies of *Galeotti Manfredi; Aristodemo,* and *Caio Gracco.*

MONTICELLO, the former residence of Thomas Jefferson, in Albemarle co., Va., near the city of Charlottesville. For many years it was in the possession of the Levy family, who kept it in admirable repair. Several movements have been started to purchase the place as a memorial, and in 1923 the most aggressive ever to be made to bring this about was begun. Thomas Jefferson is buried in a small private graveyard, adjoining the road leading to the residence.

MONTMÉDY, a town and second-class fortress of France in the dept. of Meuse. It is defended by extensive outworks, and has a barracks, military hospital and prison, and manufs. hosiery and leather. Pop. 3,000.

MONTMORENCY (1) a riv. of Quebec, Canada, rising in Snow Lake and entering the St. Lawrence, 6 m. N.E. of Quebec. The falls at its mouth are 150 ft. wide and 265 ft. high: they supply the electric power to Quebec. (2) a com. in the dept. of Seine-et-Oise, France, 9 m. N. of Paris. The Forest of M. is a favorite resort of the Parisians. It has manufs. of cheap lace, and grows famous cherries. Pop. 6,000.

MONTMORENCY, famous Fr. family.—Anne (1493-1567), 1st Duc de M., Marshal and Constable of France; taken prisoner at *Pavia,* 1525, *St. Quentin,* 1557; put down Huguenots. Grandson, Henri, 1595-1632, Duc de M.; Fr. general; captured Ré from Huguenots and defeated Spaniards; executed for supporting Orleans.

MONTMORIN DE SAINT HÉREM, ARMAND MARC, COMTE DE (1745-92), Fr. statesman; Minister of Foreign Affairs, 1787; forced to resign, 1791; proscribed; killed in Sept. massacres, 1792; loyal royalist, but weak and incapable.

MONTONE, ANDREA DA (1368-1424), called Braccio, or Fortebraccio; Ital. mercenary leader; important in Neapolitan history.

MONTORO (38° 1′ N.; 4° 26′ W.); town, Cordova, Spain; olive oil. Pop. 15,500.

MONTPELIER, a city of Vermont, the capital of the State and the county seat of Washington co. It is on the Central of Vermont and the Montpelier and Wells River railroads, and on the Winnooski River, 40 miles S.E. of Burlington. The industries of the city include granite works and manufactures of hardware, saddlery, cotton goods and sawmill machinery. Its public buildings include the State Capitol, art gallery,

libraries, and other handsome edifices. Montpelier became the State Capital in 1805 and received a city charter in 1894. Pop. 1920, 7,127.

MONTPELLIER, a town of France, cap. of the dept. of Hérault, is situated on an eminence on the r. b. of the Lez, 30 m. S.W. of Nîmes, and 17 m. N.W. of Cette, the port of this town. It is irregularly built, with narrow, steep, but generally clean streets, and the houses are mostly well built. It has a cathedral, with no pretensions to beauty or interest; a university; an exchange, with a fine Corinthian colonnade; a court-house; a medical school, etc. The botanic garden of M., the earliest collection of the sort in France, was established in the reign of Henry IV. There are, among other establishments, cotton and woolen factories, dye-works, paper mills, distilleries, breweries, sugarhouses. Pop. about 80,000.

MONTPENSIER, DUCHESSE, DE, ANNE MARIE LOUISE D'ORLÉANS (1627-93), Fr. memoir-writer; actively supported Frondeurs; interesting *Mémoires* were pub., 1729.

MONTREAL, town, Quebec, Canada (45° 30′ N., 73° 35′ W.); situated on E. side of Montreal island, at junction of Ottawa R. and St. Lawrence; has many old Fr. buildings, giving picturesque appearance; seat of M'Gill Univ. (founded 1821); has also branch of Laval Univ. of Quebec, fine libraries, many educational and charitable establishments; great Victoria Railway Bridge across St. Lawrence. Montreal is episc. see, has R.C. and Anglican cathedrals and many churches; chief port and largest town in Canada; good harbor, open to largest steamers; 7 m. of wharfage; extensive canal communication with principal towns of Great Lakes; headquarters of all important railways; railway works, manufactures almost every article of commerce; boots, clothing, textiles, tobacco, rubber goods, hardware. Founded by French, 1642; taken by British, 1760; held by Americans, 1775-76, when recaptured by British; has suffered from fire in 1852, 1901, 1906, 1907. Pop. 1921, 607,063.

MONTREUIL-SOUS-BOIS (48° 50′ N., 2° 25′ E.), town, Seine, France; peach orchards. Pop. 45,000.

MONTREUX (46° 26′ N., 6° 55′ E.), health-resort, canton Vaud, Switzerland; includes Clarens, Vernex, Glion, Veytaux, and other villages. Pop. 20,000.

MONTROSE (56° 42′ N., 2° 28′ W.), royal burgh and port, Forfarshire, Scotland, at mouth of South Esk; fine harbor; trades in timber, fish; flax-spinning, rope-making. Pop. 1921, 10,956.

MONTROSE, MARQUESSATE AND DUKEDOM OF.—Davis, Earl of Crawford, was cr. duke, 1488-89; the Grahams of Kincardine and Old Montrose obobtained earldom, 1505, marquessate, 1644.

MONTROSE, JAMES GRAHAM, MARQUESS OF (1612-50), Scot. Jacobite leader; signed Solemn League and Covenant; joined Royalists, 1640; cr. marquess, 1644 (previously earl by creation, 1505); won many victories as commander against Covenanters, 1644-45; defeated at *Philiphaugh*, 1645, and retired abroad; invaded Scotland, 1650; defeated at *Invercarron*, betrayed, and hanged.

MONTSERRAT (16° 42′ N., 62° 13′ W.), one of Leeward Islands, Brit. W. Indies; volcanic; discovered by Columbus, 1493; settled by British, 1632; chief products, sugar and lime juice. Pop. 6,000.

MONTSERRAT, mountain, Catalonia, Spain, on side of which is Benedictine monastery dating from IX. cent. and containing wooden image of Virgin to which miraculous powers are ascribed. There are also remains of several hermitages.

MONTT, JORGE (1846-1922), a President of Chile. He was trained in the navy and having taken an active part in politics was elected president after the defeat of President Balmaceda in 1890. During his administration many reforms were inaugurated, including the establishment of the gold standard of money. He was president till 1896.

MONTT, PEDRO (1846-1910), President of Chile. At the age of 26 he was elected deputy and continued to hold a seat in the Chamber until after 1900. He was at various times Minister of Justice and Minister of Industry. In 1906 he was elected president. He reorganized the finances of the country, improved the educational system, and inaugurated many other reforms. He died in Bremen, Germany, in 1910 whither he had gone for medical treatment.

MONTYON, ANTOINE JEAN BAPTISTE ROBERT AUGET, BARON DE (1733-1820), Fr. philanthropist; chancellor of Comte d'Artois (later Charles X.), 1780-91.

MONUMENT, anything erected as a reminder of persons and events, standing as a survival of the work of man in an earlier age.

MONUMENT PARK, in El Paso County, Colorado, is a small tract containing a large collection of columns of stratified rock. These natural monuments are quaintly shaped by the effects of erosion, their outlines seeming here and there to resemble the human figure. One odd group is termed 'The Dutch Wedding.'

MONZA (45° 34′ N., 9° 17′ E.), town, Italy; former capital of Lombardy; often besieged; has cathedral dating in part from VI. cent. Pop. 45,000.

MONZONITE, group of rocks well seen at Monzoni, Tyrol; dark grey; fine and coarse grained; contain plagioclase, orthoclase, felspar, augite, biotite, hypersthene, olivine, or bronzite.

MOODY, DWIGHT LYMAN (1837-99), American evangelist; *b.* at Northfield, Mass.; *d.* there. He was employed in shoe stores in Boston and Chicago, and in the latter city was active in Sunday school and missionary work. During the Civil War he was employed by the Christian Commission and was afterwards in evangelistic work. President of the Y.M.C.A. 1865. A large church was built for him of which he became pastor, though never ordained. In 1870 Ira D. Sankey, the singer, joined him, and in 1873 they made tours of England and Scotland where they addressed vast assemblies. The same enthusiastic crowds greeted them on their return to America in New York and other cities. Mr. Moody made his home at Northfield where he built a girls academy in 1879; a training school for religious workers, and a boys academy at Mount Hermon followed. He also founded the Moody Bible Institute at Chicago (*q.v.*) and the summer conferences at Northfield. Author *Arrows and Anecdotes*, 1877; *Way and the Word*, 1877; *Heaven*, 1880; *Secret Power*, 1881; *The Way of God*, 1884, and others. See Moody, W. L. *Life of D. L. Moody*, 1900.

MOODY, WILLIAM HENRY (1853-1917), American jurist; *b.* in Newbury, Massachusetts. Graduating from Harvard in 1876 he became district attorney for the eastern District of Massachusetts 1890-95, and was prosecuting attorney when Lizzie Boden was tried for the murder of her parents. In 1895 the Republicans unanimously elected him to Congress to fill a vacancy and he was reelected to the three succeeding Congresses. In the House he had regular charge of the Sundry Civil Appropriations Bill. In 1902 he was appointed secretary of the Navy, succeeding John D. Long (*q.v.*) became Attorney-general in 1904, and associate justice of the U.S. Supreme Court, 1906-10, when he retired.

MOODY, WILLIAM VAUGHN (1869-1910), American poet and educator; *b.* in Spencer, India. After graduating from Harvard in 1893, he was instructor in English and later assistant professor of English literature at the University of Chicago. Author *The Mask of Judgment*, 1900; *Poems*, 1901; *The Fire Bringer*, 1902. Edited with R. R. Lovett, *History of English Literature*, 1902. Plays: *The Great Divide* and *The Faith Healer*, 1907.

MOODY BIBLE INSTITUTE founded by D. L. Moody (*q.v.*) in 1886, opened in Chicago in September 1889. It prepares men and women for Christian service, in knowledge of the English bible, gospel music, missions and Sunday school work, to become evangelists, Sunday School, and mission workers, etc. Educational courses in Bible, music, missionary and Sunday School. Outside of class-room work students are given assignments to put their training into practice. All teaching is evangelical and undenominational. The tuition is free.

MOON (Anglo-Saxon, *mona*, from root *ma*, 'to measure'), the measurer of time, the earth's satellite, and the nearest of all heavenly bodies; diameter, 2·163 miles; shines by reflected light of the sun; revolves around the earth in 27½ days (*i.e.* a lunar mo(o)n-th); mean distance from the earth, about 238,817 miles, though this constantly varies owing to ellipticity of m.'s orbit (inclined to plane of ecliptic at angle of 5°). To the naked eye, dusky markings are visible on m.'s surface; with the telescope these are seen to be high mountain ranges, craters, walled plains, and dried-up seas. The heights of the lunar mts. have been ascertained by measuring the length of their shadow, and finding the sun's altitude as seen from the m. at that particular time. Some of the mts. are 25,000 ft., while one peak in the Dörfel range is over 5 miles in height. The m.'s surface has been accurately surveyed by telescopists, and each mountain is named, some after famous astronomers (*e.g.* Gassendi, Copernicus), mythological characters (*e.g.* Atlas, Hercules), and terrestrial mts. (*e.g.* Alps, Appennines). The m.'s day and night are each a fortnight in duration. It always presents the same side to the earth.

Harvest Moon.—On Sept. 22 the sun crosses the celestial equator, and the moon (if full) rises exactly at sunset and sets at sunrise. See ECLIPSE, TIDES.

MOON, MOUNTAINS OF THE. From classical times Africa, with its geography hidden beyond the Sahara,

has been the source of mythical legends, some based on truth. The sources of the Nile remained undiscovered till 1861, when Captain Speke explored the region S. of Lake Victoria Nyanza. Ptolemy and all other geographers had placed the source in the 'mountains of the moon,' and these were mapped E. and W. in Equatorial Africa. There was nothing but rumor and legend, based probably on information 'passed down' among African tribes to Egypt. Captain Speke considered the crescent of mountains explored by him N. of Lake Tanganyika to be part of them. Dr. Beke considered them to be a N. and S. extension of the Abyssinian plateau. They are now generally identified with the group round Mounts Kenia and Kilima-Njaro, or the group round Ruwenzori further W. The latter is more probably correct.

MOONSHINE, a term applied to the illicit distillation of liquor. It is carried on chiefly in the Southern States, and has resulted in many conflicts between mountaineers, who are the chief makers of such liquor, and the revenue officers who are sent to detect and arrest them.

MOORE, GEORGE (1851), Brit. novelist and dramatist. Wrote *A Modern Lover*, *Esther Waters*, *Celibates*, and *The Brook Kerith*. He has also written *Modern Painting*; *Hail and Farewell*; *Ave, Salve, Vale*, 3 vols.; some verse, and the plays, *The Strike at Arlingford*, *The Bending of the Bough*, *Elizabeth Cooper*.

MOORE, JOHN (1729-1802), Scot. physician and author; wrote interesting sketches of contemporary life in England and on the Continent, giving, among other things, an account of scenes in the Fr. Revolution; author of novel, *Zeluco*, on which Byron's *Childe Harold* was based.

MOORE, SIR JOHN (1761-1809), Brit. general; *b.* Glasgow; officer in American War, 1778-83; M.P., 1784; wounded in Corsican campaign, 1792; served in W. Indies and Ireland, Holland campaign, and Egypt; noted military trainer; commander-in-chief in Mediterranean; famous conduct of Span. resistance to France; march of Light Brigade and battle of *Corunna*, 1809; slain and buried, by dying wish, in ramparts of Corunna; verses, *Burial of Sir John Moore*, are by Rev. Charles Wolfe.

MOORE, JOHN BASSETT (1860), American lawyer and diplomat; *b.* in Smyrna, Delaware. Graduated University of Virginia, 1880; bar, 1883; joined Department of State, 1885; 3rd assistant Secretary of State, 1886; acting Secretary of State in conference with representatives of Great Britain and Germany on Samoa, 1887; resigned, 1891, for chair of International Law and Diplomacy at Columbia University, April, 1898; assistant Secretary of State; resigned in September to join American Peace Commission in Paris, as secretary and counsel; agent for United States before United States and Dominican Tribunal. Delegate of U.S. at the 4th Inter-American Conference, Buenos Aires, 1910; Delegate U.S. International Conference of Jurists, Rio Janeiro, 1913. Member Permanent Court of Arbitration at The Hague; Counsellor of Department of State; resigned March 1914. Amer. representative; Permanent Court of International Justice. President American Political Science Association, 1913-14; Vice-President, Pan-American Society of America. An incorporation of National Red Cross, etc. Author *Extradition and Interstate Rendition*, 1891; *Digest of International Law* (8 vols.), 1906; Editor *Works of James Buchanan* (12 vols.), 1908; *Four Phases of American Development*; *Federal, Democratic, Imperialist, Expansion*, 1912.

MOORE, THOMAS (1779-1852), Irish poet; *b.* Dublin; ed. Dublin Univ., and went to London to study law. App. Admiralty registrar at Bermudas, M. tired of the work, left a substitute, and came home; substitute embezzled $30,000, M. was held responsible, and to avoid arrest lived abroad; cleared off debt in time; was pensioned and *d.* insane. Chief poetical works—*Irish Melodies*, 1807; *Lalla Rookh*, 1817; prose works are *The Epicurean*, 1827, a romance; *History of Ireland*, 1834-46; *Life of Sheridan*, 1825, and his great *Life of Byron*, 1830.

MOORE, WILLIS LUTHER (1856), meteorologist; *b.* at Scranton, Pennsylvania; educated in the Binghamton public schools. Studied for fifteen years Natural sciences under staff of the Weather Bureau. Has degrees from several colleges. Entered Chicago Weather Bureau in 1891 and rose to be local forecast official in 1894. Against twenty-three contestants won a professorship meteorology in 1894. From 1895-1913 chief of United States Weather Bureau. In 1912 at London one of United States representatives in First International Radio Congress. At Rockville, Maryland from 1907-19 managed and owned large farm. President from 1905-10 of the National Geographic Society. Author of *Moore's Descriptive Meteorology*, 1901; *The New Air World*, 1922.

MOOREHEAD, a city of Minnesota,

in Clay co., of which it is the county seat. It is on the Northern Pacific and the Great Northern railroads, and on the Red River of the North. It is the center of an extensive agricultural region and has grain elevators, silo factories, railroad yards, foundries and machine shops. It is the seat of the State Normal School and Concordia College. Pop. 1920, 5,720.

MOORISH ARCHITECTURE. See ARCHITECTURE.

MOORS (from Lat. *Mauri*, dark men) natives of Morocco; an independent people till conquered by Augustus, 25 B.C., and made part of the kingdom of Numidia; became Mohammedan after the Arab invasion in VII. cent., and now are more Arab than African; term applied to N. African invaders and conquerors of Spain, VIII.-XV. cent.; a *white* race, though sunburnt.

MOOSE. See under DEER FAMILY.

MOOSE, LOYAL ORDER OF, a fraternal and secret organization founded in 1888 by Dr. J. H. Wilson in Louisville, Kentucky. The first lodge was organized in Cincinnati. The Supreme Lodge is the governing body. The chief purpose of the order is social, and there is no obligation to buy insurance, or provide sick, or death benefits. A Home and vocational school for orphans and dependents of members of the order, are located on a farm of 1000 acres at Mooseheart, near Aurora, Ill. Lodges, 1,669. Membership, 568,057.

MOOSEHEAD LAKE, the largest lake in Maine on the boundary between Piscataquis and Somerset counties at an elevation of 1026 feet. It is 35 miles long and from 7 to 12 wide. A number of rivers enter it and the Kennebec is the outlet. Fish and game abound. The Canadian Pacific railroad skirts the S.W. shore connecting Greenville and Moosehead.

MOOSEJAW, a city of Saskatchewan, Canada. It is on the Canadian Pacific, the Grand Trunk Pacific and the Canadian Northern railroads, and on the Moosejaw river. It is an important manufacturing city. Pop. about 14,000.

MOQUEGUA (17° 10′ S., 70° 53′ W.), maritime province, Southern Peru; capital, Moquegua; subject to earthquakes. Pop. 40,000; town, 7,000.

MOQUIS. See INDIANS, AMERICAN.

MORACEÆ, trees or shrubs, possessing latex and mostly tropical in distribution; includes mulberry, fig, hemp, hop, and other economically important plants.

MORADABAD (28° 51′ N., 78° 49′ E.), city (and district), United Provinces, India; on Ramganga; trading center; brassware. Pop. 82,000; (dist.) 1,200,000.

MORAL PHILOSOPHY, see ETHICS.

MORALITY PLAYS, see DRAMA.

MORAN, THOMAS (1837), American artist; *b.* in Bolton, England. He came to the United States in 1844 and in 1856 exhibited at the Pennsylvania Academy of Fine Arts. In 1871 he was with the Hayden Expedition in the Yellowstone region which resulted in his painting 'The Great Canyon of the Yellowstone' bought by the government and hung in senate hall at the capitol. 'Chasm of the Colorado' was also purchased by the government. Among his best known paintings are 'Mountain of the Holy Cross,' 'Shoshone Falls,' 'The Grand Canal Venice' and 'The Pearl of Venice.'

MORAR (26° 14′ N., 78° 17′ E.), town, Gwalior, Central India. Pop. 21,000.

MORAT, MURTEN (46° 55′ N., 7° 5′ E.), small town, canton Fribourg, Switzerland, on Lake Morat; scene of defeat of Charles the Bold by Swiss, 1476.

MORATALLA (38° 19′ N., 1° 49′ W.), town Murcia, Spain; wine, soap. Pop. 13,500.

MORAU, EDWARD (1829-1901), an American painter. Studied under Hamilton and Weber. He was noted as a marine painter, later turning to figure painting. Among his best works are *Launch of the Life Boat, The Lord Staying the Waters, Outward Bound.*

MORAVA, the chief river of Moravia, Czecho-Slovakia, a tributary of the Danube which it joins after a course of about 200 miles.

MORAVIA, former crownland, Austria, now part of Czecho-Slovakia (49° 20′ N., 16° 30′ E.); surface generally mountainous, intersected by spurs of Sudetic and Carpathian Mts.; extensive forests; produces cereals, beet sugar, beer, cigars, coal, iron, graphite; manufactures woolen, linen, cotton textiles. Cap. Brünn. Moravia came into possession of Austria, 1526; constituted a separate province, 1849; overrun by Prussians, 1866; became part of Czecho-Slovakia, 1918. Area, 8,583 sq. m.; pop. 2,622,000.

MORAVIAN BRETHREN, HERRNHUTERS, religious society, *Unitas Fratrum*; founded in Moravia in XV. cent.; in 1467 they chose by lot their

first bp.; Lucas of Prague increased their numbers, and by 1500 there were 400 churches; persecution almost destroyed them, 1600-27. In 1722 Christian David led a small band to Silesia, where Count Zinzendorf gave them a settlement—Herrnhut ('The Lord's Watch'); in 1727 their first church was founded. Today the society flourishes in Germany, Britain, America.

MORAY FIRTH, an arm of the North Sea. It is about 18 m. across the entrance, from Tarbat Ness to Burghead. The Spey and the Deveron are the chief rivers draining into the Firth.

MORBHANJ (22° N., 86° 30′ E.), native state, Bihar and Orissa, India. Pop. 625,000.

MORBIHAN (47° 50′ N., 2° 40′ W.), coast department, N.W. France; area, 2738 sq. miles; coast much indented; surface generally undulating plateau; chief towns—Vannes (capital), Lorient. M. produces apples, cereals, honey, salt; important fisheries; manufactures cider. Pop. 580,000.

MORDVINS, a race of people inhabiting a portion of European Russia, belonging to the Finnish family. The chief sources of livelihood are cattle raising, hunting, fishing and bee keeping. They number about 500,000.

MORE, HANNAH (1745-1833), Eng. author; first pub. plays in 1762, and soon became friend of Johnson and Garrick; gradually she became more religious and wrote moral books. In *Village Politics* she opposed revolutionary tendencies. Her later life was largely devoted to philanthropy and the encouragement of popular education.

MORE, HENRY (1614-87), Eng. philosopher and divine; spent most of his life in Cambridge, firmly declining all preferment; next to Cudworth, the most important of the Cambridge Platonists. His early philosophical writings were poetical. His most important works are *The Immortality of the Soul,* 1659; *Enchiridion Ethicum,* 1667; *Divine Dialogues,* 1668, and *Enchiridion Metaphysicum,* 1671, a criticism of Cartesianism.

MORE, SIR THOMAS (1478-1535), Eng. writer and statesman; *b.* London; *s.* of Justice of King's Bench, who placed him as page in household of Archbishop Morton; ed. at Oxford under John Colet and Linacre; became M.P. Speaker of Commons, 1523. After Wolsey's disgrace, M., much against his will was made Lord Chancellor of England in 1529; he filled this office admirably. In 1532 M. resigned, because of Henry VIII.'s breach with Rome; refused to acknowledge Henry's claim to title of head of Church, and was imprisoned; tried for high treason and executed, 1535.

M.'s chief work was *Utopia,* 1516, a XVI.-cent. picture of an ideal country governed by perfect laws; written in Latin, it met with the instant approval of continental humanists. His *History of King Richard* III. is an excellent example of XVI. cent. 'classical' prose. M. was a friend of Erasmus, from whose letters we glean many details concerning M.'s life; married twice; beatified by R.C. Church, 1886.

MOREAU, JEAN VICTOR MARIE (1763-1813), Fr. general; won distinction *at Tourcoing,* 1795, under Pichegru; led invasion of Germany, 1795, and skilful retreat; implicated in Pichegru plot though innocent, and displaced; reinstated, 1799, and commanded in Italy; assisted Napoleon in revolution of 1799; app. commander of Army of the Rhine; won battle of *Hohenlinden,* 1800; intrigued against Napoleon; banished.

MORECAMBE (54° 5′ N., 2° 52′ W.), watering-place, on Morecambe Bay, Lancashire, England. Pop. 1921, 19,182.

MORELIA (19° 40′ N., 100° 55′ W.), Chief town Michoacán, Mexico. Center of sugar-producing district; manufactures textiles; has cathedral. Pop. 40,000.

MORELLI, GIOVANNI (1816-91), Ital. patriot and art critic; *b.* Verona; studied science at Munich; joined patriotic movement against Austria, 1848; in Florence, and took part in war of 1848; elected deputy for Bergamo, in first free Ital. Parliament, 1860; presided of Government Commission concerning all works of art in the country, and responsible for law prohibiting sale of works of art from public and religious institutions; Senator, 1873; pub. critical cisms on art—*Critical Studies* (two vols. Eng. trans.).

MORELOS (18° 35′ N., 99° 6′ W.), inland state, Mexico; area, 2773 sq. miles; surface [generally mountainous; chief town, Cuernavaca; produces cereals, fruit, sugar, coffee. Pop. 180,000.

MORESNET (50° 43′ N., 5° 59′ E.), small territory on borders of Prussia and Belgium; formed in 1816; zinc mine. It was awarded to Belgium by the Treaty of Versailles in 1919. Pop. 3,700.

MORETO Y CABAÑA, AGUSTIN (1618-69), a Spanish dramatist, *b.* Madrid. He was a disciple of Calderon. His finest comedy is *El Desden con Desden* (Disdain met with Disdain

ut his fund of humor, his excellent haracterization, and his animation, re also apparent in *The Handsome Don Diego*, the heroic *Brave Justiciary f Castile*, and the farcical *Trampa Adelante*.

MORGAGNI, GIOVANNI BATTISTA 1682-1771), Ital. anatomist. His work n the characteristics of diseased organs, *De Sedibus et Causis Morborum per Anatomem indagatis*, fixed attention on ocal symptoms rather than on general ndications of disease, and laid the oundations of the study of pathological natomy.

MORGAN CITY, a city of Louisiana, n St. Mary parish. It is on the Louisiana Texas Railroad, and on the Intercoastal Canal, 70 miles W. of New Orleans. There is regular steamship connection with the larger gulf ports. The industries of the city, which are important, include sugar factories, lumber mills, and truck gardening. There is also a large trade in livestock. The public buildings include an Elks Home and a high school. There is also a handsome park. During the Civil War the city was the scene of important actions. Pop. 1920, 5,429.

MORGAN, DANIEL (1736-1802), American soldier; *b.* in Hunterdon County, Kentucky; *d.* in Winchester, Virginia. He served in the Pontiac War, and the Lord Dunmore War. In 1775 he commanded a company of riflemen under Washington. While fighting with Arnold at Quebec he was captured by the British and imprisoned for a year. As colonel of a Virginia regiment he fought a campaign against Burgoyne, but resigned when Congress took no notice. In 1780 he returned to the army under Gates as a brigadier general and for defeating Tarleton at Cowpens received a gold medal from Congress. Ill health caused him to resign in 1781, but he returned to the army in 1794 and helped to suppress the Whiskey Insurrection. In 1795-99 he was a member of Congress.

MORGAN, EDWIN VERNON (1865), American diplomat; *b.* in Aurora, New York. He graduated from Harvard in 1890 and studied at the Berlin University, 1891-92 and 1894-95: Assistant Professor of history, Harvard, 1892-94; instructor of history Adelbert College, Cleveland, 1895-98; secretary to the Samoan Commission 1899; secretary of legation, Seoul, Korea, 1900; and secretary at St. Petersburg, 1901. Consul at Dalmy, Manchuria, 1904; minister to Korea, 1905; to Cuba, 1905-09; to Paraguay, 1910-11; to Portugal, 1911-12; and to Brazil, 1912.

MORGAN, SIR HENRY (*c.* 1635-88), Welsh buccaneer; *b.* in Glamorganshire. In 1666 he became leader of the West Ind. buccaneers, sacked Porto Bello, and put the inhabitants to atrocious torture. He was subsequently sent to England in chains, but was pardoned by Charles II.

MORGAN, JOHN H. (1826-64), Amer. confederate soldier; led series of cavalry raids, destroying Union military stores, bridges, railways, etc.; captured in daring attack, 1863; killed in raid, 1864.

MORGAN, JOHN PIERPONT (1837-1913), American financier; *b.* in Hartford, Connecticut; *d.* in Rome, Italy. Educated at the English High School, Boston, and University of Göttingen, and began banking business with Duncan, Sherman & Co., New York City. In 1860 he was attorney for George Peabody & Company, London, and junior member of Dabney, Morgan & Company in 1864. He became head of J. P. Morgan & Company, and of J. S. Morgan & Company, London, and a partner of Drexel & Company, Philadelphia. He obtained a controlling interest in New York Central, New York, New Haven and Hartford, Reading, Erie, Lehigh, Southern, North Pacific, Big 4, Chesapeake and Ohio railroads. The U.S. Steel Corporation and others were organized by him with a capital of $1,100,000,000. A great shipping combine begun by the purchase of a British company was not completed. He was the head of the hard and soft coal trusts in 1895. A United States bond issue for $62,000,000. was floated by him in 1912. He gave largely to charities and institutions. An enthusiastic yachtsman, he built the 'Columbia' which defeated Sir Thomas Lipton's 'Shamrock.' An ardent art collector his treasures filled 13 galleries.

MORGAN, JOHN PIERPONT, JR. (1867), American financier; *s.* of J. P. Morgan (*q.v.*); *b.* in Irvington, New York. Graduating from Harvard in 1889, he was connected with the London branch of J. P. Morgan Company until 1901; was admitted to partnership and after his father's death became the head of the firm. In 1914 he resigned from the New York, New Haven, and Hartford Railroad on account of criticism of the financial management. He is a director of the U.S. Steel Corporation, the International Mercantile Marine Co., the Pullman Company, the North Pacific and the New York and Harlem railroads, and others. He supplied the $40,000,000 in gold that was paid to the French Panama Company for their rights in

the Panama Canal. During the World War he made a loan of $12,000,000 to Russia and in 1915 was appointed agent for Great Britain in the United States and given power to purchase war supplies for the Allies. In the same year he bought control of the Equitable Life Co., from T. Coleman Dupont. He was shot by a madman on July 1, 1915 but suffered only slight injuries. The Morgan Company raised a loan of $50,000,000 for France in 1915, and formed a syndicate of 2200 banks to float a loan of half a billion dollars for the Allies.

MORGAN, JOHN TYLER (1824-1907), American lawyer and politician. *b.* in Athens, Tennessee; *d.* in Washington. In 1861 he was a member of the Alabama Convention that declared for secession. As a private he joined the Confederate army in 1861 and raised a regiment in the following year of which he became colonel. In 1863, a brigadier-general, he commanded a division under Johnston. After the war he practiced law at Selma, Ala., and was U.S. senator from 1877 until his death. As chairman of the Interoceanic Canal Commission he favored Nicarauga over Panama and was removed in 1903. In 1892 he was member of the Board of Arbitration on Behring Sea Fisheries case. In 1898 a commissioner to prepare laws and organize the government of the Hawaiian Islands.

MORGAN, LADY, *nee* Sydney Owenson (*c.* 1780-1859), Irish authoress; *m.* Dr. Morgan, knighted by the Lord-Lieutenant. She wrote novels, verse, books of travel, and two vol's of *Memoirs.*

MORGAN, LEWIS HENRY (1818-81), an American archæologist and anthropologist, *b.* in Aurora, N.Y. He graduated from Union College, in 1840, studied law and began to practice in Rochester, in 1844. In 1861 he was elected to the state assembly, and to the senate in 1868. His fame, however, rests on his profound study and knowledge of the American Indians, among whom he spent a great deal of time. His first book, *The League of the Iroquois,* published in 1851, was the first scientific work describing the customs and forms of government of the American aborigines. His other books included *Systems of Consanguinity and Affinity of the Human Family,* 1869; *Ancient Society,* 1877, and *Houses and House-life of the American Aboriginies,* 1881.

MORGANATIC MARRIAGE, marriage which does not involve the children's succession to the property or rank of the father; many instances of such marriages occur in history of roya families.

MORGANTOWN, a city of Wes Virginia, in Monongahela co., of whic it is the county seat. It is on the Balt more and Ohio and the Morgantown an Kingwood railroads, and on the Monon gahela River. The industries includ glass works, furniture factories, lumbe mills, flour mills and mines. It is th seat of the West Virginia University and has several important public build ings. Pop. 1920, 12,127.

MORGARTEN (47° 6′ N., 8° 40′ E.) mountain, Switzerland; scene of Swis victory over Austrians, 1315.

MORGENTHAU, HENRY (1856 Ambassador; *b.* in Mannheim, Germany Came to the United States in 1865 Educated in the public schools and th College of the City of New York. Fron 1879-99 a member of the law firm i New York of Lachman, Morgentha and Goldsmith. From 1899-1905 pres dent of a bond and trust company President of his own company from 1905 13. Director 1915-21 of other companie also president of a realty company In 1912 chairman of the finance com mittee of Democratic National Com mittee, also from 1916-20. In 1913-1 ambassador to Turkey. From 1914-1 in charge of various countries interest in Turkey. Appointed by Presiden Wilson in 1919 as member of missio to investigate condition of Poland. I 1920 nominated as Ambassador t Mexico. Director of the Institute o International Education.

MORGUE, LA, a building in Pari behind the cathedral of Notre Dam where unknown bodies, either found i the streets or recovered from th Seine, are exposed for identificatio After three days, if not claimed, the are buried.

MORIER, JAMES JUSTINIAN (1780-1849), a traveler and novelis secretary to the British ambassado 1810, and during the six years of h residence in Persia he became thorough acquainted with the character of th natives. Published *Journey throug Persia, 1808-9,* in 1812. The best o his eastern novels, entitled *The A ventures of Hajji Baba of Ispaha* appeared in 1824, 3 vols.

MORISCOS, Span. name for conver from Islam to Christianity. Aft Span. conquest of Granada, Moha medanism was gradually crushed o about 1525. The M's were expelled fro Spain, 1609.

MORLAIX (48° 36′ N., 3° 49′ W.

town, on Eng. Channel, Finistère, France. Pop. 16,200.

MORLAND, GEORGE (1763-1804), Eng. painter; led an irregular life, and d. in a London sponging-house. He turned out a vast number of paintings and drawings; many of his canvases deal with the sea, but he excelled in rural subjects.

MORLANWELZ (50° 27′ N.; 4° 13′ E.), town, Hainault, Belgium; coal mines; ironworks. Pop. 8,600.

MORLEY (53° 45′ N.; 1° 38′ W.), town, Yorkshire, England; woolen mills. Pop. 1921, 23,935.

MORLEY, HENRY (1822-94), Brit. author; for many years prof. of Eng. Language and Lit. at Univ. Coll., London. His numerous works include the well-known *First Sketch of Eng. Lit.*

MORLEY OF BLACKBURN (JOHN MORLEY), 1ST VISCT. (1838-1923), English statesman and author; educated Cheltenham and Oxford; called to the bar, 1873; ed. *Fortnightly Review*, 1867-83; subsequently *Pall Mall Gazette*, 1880-3), and *Macmillan's Magazine*, 1883-5; secretary for Ireland, 1886, and again in 1892; secretary for India, 1905-10; cr. Viscount Morley, 1908; lord president of Council, 1910-14; an honest and fearless politician; a consistent upholder of Home Rule. His *Life of Gladstone*, 1903, was a masterpiece of biography; other works include able studies of Burke, Voltaire, Rousseau, Diderot, Cobden, Walpole, Cromwell, and a brilliant essay, *On Compromise.*; pub. a vol. of *Recollections*, 1917.

MORMONS, 'The Church of Jesus Christ of Latter-day Saints,' an Amer. sect; owe their origin to Joseph Smith, 1805-44, a religious fanatic. An angel, so he believed, appeared to him in a vision, telling him that he would find a sacred book written on gold plates buried in a certain spot. What exactly happened is obscure, but he seems to have possessed gold plates with mysterious writing. These formed the *Book of Mormon*, giving the history of America. A church was founded at Fayette, New York, 1830; moved to Kirtland, Ohio, where Smith was joined by Sidney Rigdon, 1830, and Brigham Young, 1832. The presidency was established in 1833, the apostolate of twelve in 1835, and the foreign mission in 1837. A temple was built and a bank founded; but the latter failed, and Rigdon and Smith fled to Missouri, where a colony had been founded in 1831. Opposition arose, and in 1839 12,000 Mormons were driven out and took refuge in Nauvoo, Illinois, 1840. In one year, 1842 1,614 converts arrived from Great Britain alone. In 1843 Smith had a 'revelation' which definitely enjoined polygamy.

In 1846 the Mormons had to leave Nauvoo, and emigrated to the Great Salt Lake Valley in Utah, where they founded Salt Lake City. In 1850 Utah became a 'territory' of the U.S., with Young, Smith's successor, as governor. In 1852 a 'Reorganized Church of Latter-day Saints' was founded, which rejected polygamy. Young died in 1877, leaving many wives and numerous children. Utah became a state in 1896, polygamy being legally abolished. Mormons still flourish in the U.S. They have also made some efforts to evangelize other countries, notably Britain. They have an elaborate system of church government, with a large number of different offices—a president, councillors, patriarchs, apostles, elders, priests, teachers, deacons, etc. The Bible, *The Book of Mormon*, and *Doctrine and Covenants* form the basis of their belief, which looks for a continuance of revelation and miracles, an American Zion, a millennium, and the palingenesis of earth under Christ's rule.

MORNAY, PHILIPPE DE, SEIGNEUR DU PLESSIS (1549-1623), Fr. Huguenot leader; a profound scholar; won renown by Lat. treatise, 1571, on *The Visible Church*; Henry of Navarre's chief councillor.

MORNY, CHARLES AUGUSTE LOUIS JOSEPH, DUC DE (1811-65), Fr. statesman; illegitimate; half-bro. of Napoleon III.; obtained important position in financial world; became Minister of Interior on revolution, 1851; pres. of *Corps legislatif*, 1854; held Liberal views; exercised great influence over Napoleon.

MOROCCO, Fr. protectorate and Span. zone (*er Rif*), N.W. Africa (27°-36° N., 1°-11° 40′ W.), bounded N. by Atlantic and Mediterranean, N.E., S.E. and S. by Algeria and Fr. Africa, N.W. by Atlantic, and separated from Europe by Strait of Gibraltar (9 m.). Country is traversed from N.E. to S.W. by Atlas Mountains, which reach an extreme height of from 13,000 to 15,000 ft.; parallel chains of these with their foot-hills and offshoots spread out so widely as to render surface hilly almost everywhere, but especially so in N. Climate in dist. N.W. of Atlas is healthy and pleasant; to S. of Atlas there is little rain and sometimes long-continued drought. Morocco is drained by Muluya and many smaller streams to Mediterranean; and by Sebu, Um er Rebia, and other streams to Atlantic. Rivers flowing S. from Atlas are lost in marshes of desert margins.

Resources.—Between Atlas Mts. and Mediterranean, and extending westward to Atlantic, is the fertile Tell region, covering one-third of whole area, and producing heavy crops of wheat, barley, corn, cotton, hemp, olives, dates, and Mediterranean fruits. Pasture land covers about one-eighth of whole area, where numbers of cattle, sheep, goats, horses, and mules are raised. Minerals include gold, silver, copper, lead, tin, antimony, iron, coal, but these have not been fully developed. Industries are carpet, slipper, and leather manufactures; sericulture is being developed. Chief exports are cereals, eggs, wool, fruit, olive oil, esparto, hides. There are no railways except the military narrow-gauge lines. Roads are being improved by the French. By a bi-weekly aeroplane service from Toulouse, Rabat may be reached in two days.

Morocco has four capitals—Fez, Morocco, Meq'inez, and Rabat. Coast towns open to foreign trade are Casablanca, Laraish, Mazagan, Mogador, Rabat, Saffi, Tangier, Tetuam. Certain other closed ports are to be opened. Inhabitants are Berbers, Arabs, Tuaregs, Jews, negroes, and half-breeds. Area, *c.* 231,500 sq. m.; pop (est.) 6,000,000.

Government, before Fr. régime began, was despotism, sultan being both temporal and spiritual head of empire. Fr. government is now represented by resident-general. Mohammedanism prevails, but freedom of religion has been proclaimed. Army is under Fr. supervision. Several ports and *presidios* on the Mediterranean coast are under Spanish government—Melilla, Chaffarinas Islands, Alhucemas, Ceuta, etc.; as also Ifni and Rio de Oro on Atlantic coast. Fr. and Span. spheres of influence were determined in 1913, the Tangier dist. (140 sq. m.) being internationalized.

History.—In anc. times Morocco was a Roman prov.; it was conquered by Arabs in 8th cent., and thenceforth held an independent position under various native dynasties. First of these was the Idrisite dynasty founded by a descendant of the Prophet (*c.* 789), which endured until the late 10th cent., and was followed by many others. The present dynasty, the Alides, was established in 1649 by Mohammed XIV., whose *bro.* Mulai Ismail (1672-1727), after a career of conquest, made himself master of whole country. During 17th and 18th centuries Moroccan pirates (Salli rovers) were the dread of W. Europe. Under Mulai Sid Mohammed (Mohammed XVI.), who reigned 1757-90, an attempt was made to introduce European civilization. His death was signal for struggle between several of his sons, three of whom reigned in turn. War with France twice occurre in reign of Abd-er-Rahman II. (1822-59 and in following reign Mohammed XVI was defeated by Spain (1859-60). H was succeeded in 1873 by his *s.* Mula el-Hassan III., in whose reign occurre the Conference of Madrid (1880), whe regulations were made concerning pr tective rights of various Europea powers in Morocco. In reign of Abd-e Aziz IV. (1894-1907) occurred rebellio caused by his introduction of foreig customs. In 1904, an Anglo-Frenc agreement was made whereby Franc and Britain recognized each other interests in Morocco and Egypt. Ge many being dissatisfied, an interna national conference was held at Algeçira in 1906, all members of which signe agreement, *inter alia* entrusting policin of Morocco to France and Spain jointl Abd-el-Aziz was deposed in 1907 b his *bro.*, Mulai Hafid, who abdicate (1912) in favor of his *bro.* Mulai Yuse Internal disorder necessitated constan Fr. operations. Spain sent expeditio to Melilla (1909), and to Laraish (1911 and claimed regions opposite Spa coast and adjoining Span. colony, R de Oro. In 1908 and 1911 occurre Franco-Ger. crises, marked by inciden at Casablanca and Agadir. Eventuall by agreement (1911), Germany pract cally recognized Fr. protectorate Morocco, in return for section of F Congo; the sultan accepted Fr. pr tectorate (1912). During World W 34,500 Moroccan troops went to Frenc or Salonica front. See MAP AFRICA.

MOROCCO LEATHER, a kind leather made from the skin of goats a tanned with sumach. It is used exte sively in the binding of books, t making of shoes, upholstery, furnitu etc. The art of preparing it was deriv from the Moors.

MOROCCO, MARRAKESH (31° 3 N., 7° 30′ W.), one of capitals of Moroc founded, 1073; manufactures moroc leather. Pop. 60,034.

MORÓN, MORÓN DE LA FRO TERA (37° 7′ N., 5° 27′ W.), tow Seville, Spain; marble and chalk qua ries. Pop. 15,500.

MORON. See INTELLIGENCE TEST

MOROSINI, old patrician family Venice which produced doges, diploma ists, soldiers, and writers. Chief me bers: Dominic (1080-1156), Mari (*d.* 1252), Andrea (1558-1618), a Francesco (1618-94).

MORPETH (55° 11′ N.; 1° 40′ W town, Northumberland, England; ir foundries, collieries. Pop. 1921, 7,58

MORPHEUS (classical myth.), *s.* of Sleep; god of dreams.

MORPHINE, MORPHIA, $C_{17}H_{17}NO(OH)_2+H_2O$; chief alkaloid in opium (about 10%); crystallizes from alcohol in small prisms; a monacid, tertiary base, forming salts; (*e.g.*) hydrochloride; soporific; to relieve pain a solution of the acetate is injected hypodermically.

MORPHOLOGY is the study of form, dealing with the structures of animals and plants, external and internal. The study of the cell, which is the morphological unit, comes under the heading of histology. External morphology deals largely with symmetry, while internal deals with the structures formed by cells. The simplest living structures are unicellular—(*e.g.*), Protozoa. All others are multicellular. The cells form the tissues, and these in turn form the organs.

MORRILL, JUSTIN SMITH (1810-98), Amer. statesman; leader of republicans; brought in educational bill, 1857 and 1861, which became Land Grant Act of 1862; author of Tariff Act of 1861.

MORRIS, CLARA (1849), an American actress; *b.* in Toronto, Canada. She came to Cleveland, Ohio, as a child, made her first appearance in Wood's Theater, in Cincinnati, and in 1869 joined Augustin Daly's Fifth Avenue Company, in New York. Later she toured the country and became extremely popular in emotional roles, such as Lady Macbeth, Camille, and the leading part in 'Leah the Forsaken.' A later generation has come to admire her as a writer, her books, largely of stage life, being written in an extremely popular style. These include *A Silent Singer*, 1899; *My Little Jim Crow*, 1900; *A Pasteboard Crown*, 1902; *Left in Charge*, 1907; and *Dressing Room Receptions*, 1911.

MORRIS, GOUVERNEUR (1752-1816), Amer. statesman; member of New York Provincial Congress (afterwards Convention), 1776-77; helped to draft constitution of U.S.A.; chairman of committee which refused negotiation till recognition of independence, 1778; wrote pamphlets on currency and taxation, advocating decimal system and 'dollar' and 'cent' as name for units; ambassador to France, 1792-94; advised separation of northern and southern States; *Life*, by Roosevelt.

MORRIS, GOUVERNEUR (1876), an American author; *b.* in New York City. He graduated from Yale University, in 1898, but even before his graduation had made a successful beginning in literature. Among his works are: *A Bunch of Grapes*, 1897; *Tom Beauling*, 1901; *The Pagan's Progress*, 1904; *Putting on the Screws*, 1909; *The Voice in the Rice*, 1910; *If You Touch Them They Vanish*, 1913; *When My Ship Comes In*, 1915; *The Seven Darlings*, 1915; *We Three*, 1916; *The Wild Goose*, 1919 and *Yellow Men and Gold*, 1921.

MORRIS, ROLAND SLETOR (1874), an American diplomat; *b.* in Olympia, Wash. He graduated from Princeton University, in 1896, studied law and began to practice in Philadelphia, Pa., in 1899. He became prominent in politics as a Democrat and for three years was state chairman of the Democratic Party in Pennsylvania. In 1917 he was sent as U.S. Ambsssador to Japan, where he remained until 1921 during this period being sent twice on special missions to Siberia.

MORRIS, ROBERT (1734 - 1806), American financier and statesman. One of the signers of the Declaration of Independence. *b.* in Liverpool, Eng. *d.* in Philadelphia. He came to the colonies in 1847 and was engaged in mercantile business 1754-1793. In 1775 he was a member of the provincial assembly, and 1776 - 1778 of the Continental Congress. He voted against the Declaration of Independence July 2, 1776, but signed it on August 2. He had charge of affairs when Congress fled to Baltimore, December 12, 1776. When Congress assembled again in Baltimore Morris, George Clymer of Pennsylvania and George Walter of Georgia were commissioned to transact Continental business. He was elected Superintendent of Finance February 20, 1781. Funds were at a low ebb, and he borrowed money on his own credit to finance the war. The Bank of North America which he founded opened in 1782. He was a member of the Pennsylvania Assembly 1776 - 1778, 1778-1779, 1780 - 1781 and 1785 - 1787. In the last year, member of the convention that framed the U.S. constitution, U.S. senator from Pennsylvania 1789-1795. Great speculations in real estate resulted in his failure, and he was imprisoned for debt in Philadelphia in 1798.

MORRIS, WILLIAM (1834-96), Eng. poet, artist, and Socialist; *b.* Walthamstow, Essex; ed. Oxford. His first book, *The Defense of Guinevere*, 1858, showed imagination and romance, and *The Life and Death of Jason*, 1867, and *The Earthly Paradise*, 1868-70, confirmed his greatness as poet. Other poetical

works were *The Aeneid of Vergil*, 1876; *Sigurd the Volsung*, 1876; *The Fall of the Niblungs*, 1877, and, with E. Magnusson, many translations of Icelandic Sagas. His own work includes *The Story of Grettir the Strong*, *The Volsunga Saga*. During years 1889-96 he wrote some beautiful romances—*The House of the Wolfings*, etc.

MORRISON, ARTHUR (1863), English novelist, dramatist, and writer on Oriental art. His works include *Tales of Mean Streets*, 1894; *Chronicles of Martin Hewott*, 1895; *To London Town*, 1899; *The Green Eye of Goona*, 1904; *Green Ginger*, 1909; *The Painters of Japan*, 1911. Among his plays are *That Brute Simmons*, 1904, and *A Stroke of Business*, 1907.

MORRISON, FRANK (1859), an American labor leader; *b.* in Franktown, Ontario, Canada. After finishing his common school education in his native city, he came to Chicago, where he studied law, but instead of practicing took up the trade of a printer. Being very active in his labor organization, he filled various official positions in it until 1897, when he became secretary of the American Federation of Labor, a position he has held continuously ever since.

MORRISON, JOHN FRANK (1856), an American military officer. Graduated from West Point Military Academy in 1881. Was American military observer during Russo-Japanese War. In Hawaii and Panama, 1912-13. Brigadier-general in 1915 and major-general in 1917. Appointed Director of Training, 1918, and made a tour of inspection in France. Wrote *A Study in Troop Training*.

MORRISON, ROBERT (1782-1834), Brit. missionary; translator to E. India Company at Canton (1809); established college at Malacca, 1818; wrote various etymological works on Chin. language.

MORRISTOWN, a city of New Jersey, in Morris co., of which it is the county seat. It is on the Lackawanna and Morristown and Erie railroads. Morristown is a favorite residential suburb of New York City and has great historical interest. Within the city limits are the remains of Fort Nonsense built by Washington's troops, and now a memorial monument. There is also a house used by Washington as his headquarters. This is used as a memorial museum. The city is surrounded by high ranges of hills of great scenic beauty. It is the seat of Morris Academy, Dana Seminary, and has two hospitals, a public library and other public buildings. The State Lunatic Asylum is on Morris Plains, 4 mile from the city. The industries includ the manufacture of hosiery, wire, iron etc. Pop. 1920, 12,548.

MORRISTOWN, a city of Tennessee in Hamblin co., of which it is the count seat. It is on the Southern and th Knoxville and Bristol railroads. Th city is the center of an extensive agri cultural region. Its industries includ the manufacture of flour, stoves, hosiery furniture, wagons, concrete, etc. It i the seat of the Morristown Normal an Industrial College and an educationa institution for negroes. Pop. 1920 5,875.

MORSE, EDWARD SYLVESTE (1838), zoologist; *b.* in Portland, Maine Educated at Maine Academy. Ha degrees from various colleges. Professo for a few years at Bowdoin Colleg on comparative anatomy and zoology From 1872-1873 lecturer at Harvar University. Since 1892 at the Museu of Fine Arts, has been keeper of Japanes pottery. Author of *First Book of Zoology* 1875; *Japanese Homes and Thei Surroundings*, 1886; *Catalogue of th Morse Collection of Japanese Potter* (Museum of Fine Arts, Boston), 190 *Glimpses of China and Chinese Home* 1902; *Mars and Its Mysteries*, 1906 *Japan, Day by Day*, 1917.

MORSE, JOHN TORREY JR (1840), author; *b.* in Boston, Massa chusetts. In 1860 graduated fro Harvard College. From 1862-1880 Boston practicing law, and since the has been writing. In 1876 a membe of the House of Representatives fro Massachusetts. In 1879-1891 an ove seer of Harvard. Co-editor of an inte national review for four years. Author *Treatise on the Law Relating to Bank and Banking*, 1870; *Law of Arbitratio and Award*, 1872; *Famous Trials*, 187 *Life of Alexander Hamilton* (2 volumes 1876; *Life and Letters of Oliver Wende Holmes* (2 volumes), 1896; *Life an Letters of Colonel Henry Lee*, 190 He was editor of American Statesme Series and his books *Abraham Linco* (2 volumes), *John Quincy Adam Benjamin Franklin*, *John Adams*, *Thom as Jefferson* appeared in this series.

MORSE, SAMUEL FINLEY BREES (1791-1872), American inventor an artist; *b.* in Charlestown, Massachusett April 27, 1791. *d.* April 2, 1872. Grad ating from Yale in 1818 he went England to study painting, and w awarded a gold medal by the Adelp Society for *Dying Hercules*. In 182 1825 he was founder and first preside of an art association in New York th

became the National Academy of Design. Professor in the University of the City of New York 1828. The idea of the telegraph came to him while on shipboard returning from Europe in 1832. He constructed apparatus in 1835 and 1837. When Congress refused in the following year to finance an experimental line between Washington and Baltimore he went to England in the hopes of getting capital. After four years struggle on March 4, 1843 Congress voted $30,000 for telegraph experiments. In 1844, when the Morse electro-magnetic telegraph system was a proven success honors and decorations were showered upon him by the great powers of Europe. He laid the first submarine telegraph in New York harbor in 1842, and with John W. Draper he made the first daguerreotype.

MORSHANSK (53° 27′ N., 41° 53′ E.), town, on Tsna, Tambov, Russia; manufacturers floul, tallow. Pop. 30,200.

MORTALITY.—*The law of mortality*: In actuarial calculations the law which, founded on the average M. for any given number of years, determines the proportion of persons who die in any assigned period of life or interval of age out of a given number who enter upon the same interval.

MORTAR, a vessel in which substances are pounded or triturated by a *pestle,* used in preparing drugs. The piece of ordnance formerly used in sieges, etc., was called a m. from its resemblance to the druggist's m. Howitzers superseded m's. Building m. ordinarily consists of a mixture of slaked lime and sand; hardening is due principally to absorption of atmospheric carbonic acid, and the formation of silicate of lime. There are also hydraulic m's which set under water, and various cement m's. The adhesion becomes less as the proportion of sand increases. Portland cement m. is the strongest and most durable.

MORTGAGE.—A mortgage arises when a person transfers the general property in his land or goods to another as security for a loan. As a rule, the *mortgagor*—the borrower—does not hand over possession of the land to the lender —the *mortgagee*—but remains in possession himself. Hence the distinction between a m. and a pledge. Failure to make the necessary payments of interest in return for the loan results in the mortgagee *foreclosing* on the property and taking possession.

MORTLAKE (51° 28′ N., 0° 16′ W.), village on Thames, Surrey, England; terminus of Oxford-Cambridge boatrace.

MORTMAIN. In mediæval times it became a common practice for persons to alienate land to religious bodies, thinking thereby they 'purchased heaven,' thus locking it up in a 'dead hand'. Various statues were passed (Henry III. to Henry VIII.) to check the practice.

MORTON, JAMES DOUGLAS, 4TH EARL OF (*c.* 1525-81), Lord Chancellor of Scotland, 1562-72; one of Lords of the Congregation, but always willing to temper religion with policy; chief agent in murder of Rizzio; implicated in murder of Darnley; commanded at *Langside* against queen, 1568; regent, 1572-78, and was considered ablest man in Scotland; admiral, 1578-81; executed.

MORTON, JOHN (*c.* 1420-1500), abp. of Canterbury (1486); advanced to great honors by Henry VII.; cardinal, 1493; remembered for *Morton's Dyke,* in Fens, *Morton's Fork* (infallible means of exacting money for king's use), and as patron of Sir Thomas More.

MORTON, JULIUS STERLING (1832-1902), a U.S. Secretary of Agriculture; *b.* in Adams, N. Y. He graduated from Union College, in 1854, went to Nebraska City, where he became a journalist, and subsequently was editor of the Nebraska City News. He was a member of the Territorial legislature, then, in 1858, secretary of the Territory, and acting governor after the resignation of Governor Richardson. President Cleveland appointed him Secretary of Agriculture, which position he held during 1893-7. He was the originator of Arbor Day.

MORTON, LEVI PARSONS (1824-1920), American banker and politician; *b.* at Shoreham, Vermont, May 16, 1824. *d.* Rhinebeck, New York, May 16, 1920. After a limited education at academies he entered mercantile life in Hanover in 1843. and began banking business in Boston in 1850. In 1863 he founded the firm of Levi P. Morton and Company in New York (later Morton, Bliss & Company) and helped to float a government loan during the Civil War. He was elected to Congress 1878-1881, and in the latter year was appointed Minister to France, when he obtained legal status for American corporations in that country. In 1888 he was elected vice-president and in 1894 governor of New York. In 1896 he was New York State's choice for president at the Republican National Convention.

MORTON, OLIVER PERRY (1823-1877), an American statesman; *b.* in Salisbury, Wayne co., Ind. He studied law and began to practice in Centerville,

Ind., in 1846, became a circuit judge, in 1852, was active in politics as a Democrat, but after the outbreak of the Civil War became a Republican on the issue of slavery. In 1860 he was elected lieutenant-governor, and in the following year succeeded Governor Lane when the latter went into the U.S. Senate. His loyalty to the cause of the Federal Government was extremely pronounced, his life being at times threatened by the Knights of the Golden Circle. He served in the U.S. Senate during 1867-77.

MORTON, PAUL (1857-1911), an American financier and a Secretary of the U.S. Navy; *b.* in Detroit, Mich. At the age of 16 he entered the employ of the Burlington & Missouri River R.R. as an office boy, rising quickly from grade to grade till he was general freight agent of the Chicago, Burlington & Quincy R. R. Later he was a vice-president of the Atchison, Topeka & Santa Fe R. R. He was originally a Democrat, but turned Republican on the silver issue. President Roosevelt appointed him Secretary of the Navy in 1904, but a year later he resigned to become president of the Equitable Life Insurance Co., in New York.

MORTON, WILLIAM THOMAS GREEN, (1819-1868), an American dental surgeon. He discovered the method of producing anæsthesia with sulphuric ether.

MORVAN (*c.* 47° N.; 4° E.), mountainous region, Yonne and Nièvre, France.

MORVI (22° 49′ N.; 70° 54′ E.), native state, Kathiawar, Bombay, India. Pop. 110,000. Capital, Morvi. Pop. 19,000.

MOSAIC, a variety of surface decoration, used largely on floors and walls. In M. work variously colored fragments of marble, glass, ceramic, or other substances are arranged in a cement or mastic bed so as to produce an artistic or geometrical design. The art goes back to a very remote origin. but it reached its highest development in ancient times among the Romans. Very few old Roman villas remain in which there is not some M. work of a greater or less degree of elaboration. The best-known example is that of Hadrian's villa at Tivoli, where Pliny's doves are represented with wonderful delicacy of coloring. The *tesseroe* (the small fragments of which the M. is composed) have varied considerably in size at different times. The Roman tesseræ measured from a quarter to half an inch in size, but those used in the later 14th century Italian work were frequently under one-eighth of an inch. M. work became a special feature of Christian churches under the Byzantine empire, and Eastern influence is clearly to be seen in the Roman work.

MOSBY, JOHN SINGLETON (1833-1916), a Confederate soldier; *b.* in Powhatan county, Va. He graduated from the University of Virginia, in 1852, studied law and practiced in Bristol, Va., till the outbreak of the Civil War, when he enlisted as a private in the Confederate cavalry. He was promoted to a lieutenancy, but after a few months reduced to the ranks again. Then he offered his services to Gen. J. E. B. Stuart as a scout, guiding the Confederate cavalry in a successful raid on McClellan's Army on Chickahominy Creek, in June, 1862. In 1863 he organized the Mosby Partisan Rangers, whose guerrilla tactics became the terror of the Union armies in Virginia and Maryland. Their most brilliant exploit was the capture of General Stoughton at Fairfax Courthouse, in March, 1863, inside the Federal lines. At another time they captured one of Sheridan's entire supply trains. After the war Mosby turned to the law again, but was U.S. consul at Hong Kong during 1878-85. He wrote his *Reminiscences*, 1887 and *The Dawn of the Real South*, 1901.

MOSCHELES, IGNAZ (1794-1870), Bohemian composer and pianist; settled in London, 1826; teacher at Leipzig Conservatoire, 1846; studies, sonatas, concerts, etc.

MOSCHUS, a Greek bucolic poet was a native of Syracuse, and flourished in the 2nd or 3rd century B.C. Nothing is known of his life. His works are generally printed together with those of Theocritus and Bion. Only four *Idylls* and some fragments are extant, all but one written in the Doric dialect, and remarkable for their beauty. They have been translated into English prose by Andrew Lang, 1889.

MOSCOW, city, cap. of Russia, and second city of republic (55° 52′ N., 37° 39′ E.), on Moskva, a sub-trib. of Volga, great railway center. Main part of city, N. of Moskva, includes the *Kremlin*, or citadel, which is surrounded by a wall (65 ft high) and is most sacred spot in country to a Russian; it contains old and new imperial palaces, arsenal, monasteries, Ivan Velki bell tower, in front of which is famous Czar Kolokol bell, and three cathedrals, of which the Cathedral of the Assumption (built 1474-9), where Czars were crowned, is most important. Other public buildings include univ. founded by Catharine in 1755, observatory, museum, St. Basil's Cathedral

seat of Metropolitan of Moscow. Business city lies round Kremlin walls. City has great transit trade and is important industrial center; manufactures cotton, woolens, silks, leather, machinery, tobacco, etc.; printing trade. Canal to Petrograd is projected. Moscow was inhabited at an early date by Finnish peoples, and was settled by Great Russians in 12th cent.; became seat of Metropolitan of Central Russia (1325); pillaged by Mongols (1382); by Tartars twice in 15th cent.; became cap. of all Russia under Ivan III. in 1480; superseded as cap. by St. Petersburg (Petrograd) in 1711; several times damaged by fire in 18th cent.; occupied by French under Napoleon (1812); burned down by inhabitants; evacuated by French, who began 'retreat from Moscow.' Before World War there were riots among students on various occasions. During World War city was filled with refugees, especially at period of Ger. advance on Warsaw (Aug. 1915); in revolution of March 1917 there were only twelve casualties in the city; here Kerensky summoned the conference which led to his overthrow (Aug. 1917). Moscow became center of Bolshevist government, March 14, 1918. Pop. 1920, 1,000,000. See RUSSIA.

MOSELLE, a frontier department in the northwestern part of France. The greater part was taken by Germany after the War of 1870 and became a part of Alsace-Lorraine.

MOSELLE, MOSEL (50° 10′ N., 7° 12′ E.), river, which, rising in Vosges mts., France, flows northward through France, Luxemburg, and Prussian Rhineland, and joins Rhine at Coblenz; length, 314 miles; valley noted for wines.

MOSELY, ALFRED (1855–1917), Eng. philanthropist. In 1902 he sent at his own expense a commission to America to inquire into labor conditions prevailing in U.S., and in 1903 a commission to inquire into educational system of U.S. In 1907 he sent 700 English school teachers to study educational methods of Canada and U.S., and arranged for a return visit of 1,000 Canadian and U.S. teachers, which took place 1908-9.

MOSES (Heb. *Mosheh*), the great Jewish lawgiver and judge, *b.* of Aaron and Miriam. The records of his life and work found in the Pentateuch are very meagre, and if, as is now generally believed, the 'Books of Moses' were not written until some 800 years later, are probably to a great extent legendary (See EXODUS, NUMBERS, AND DEUTERONOMY). He was said to have been *b.* in Egypt of the tribe of Levi, and because at that time Pharaoh had decreed that every male child of the Hebrews should be destroyed, his *m.* Jochebed placed him in an ark upon the Nile, where he was found by Pharaoh's *dau.*, and adopted by her. Brought up as an Egyptian prince, his heart was yet with his own people, and finding an Egyptian oppressing a Hebrew, he slew the Egyptian and then, for safety, fled into Midian, whence he received a divine call to return and lead the chosen people out of Israel. (For the history of the plagues, the crossing of the Red Sea, and the fate of the Egyptians, see EXODUS). For forty years he was military leader, social and religious organizer, and lawgiver to the turbulent tribes in the desert wanderings, finally dying on Pisgah, or Mt. Nebo, to the N.E. of the Dead Sea. For the details of his life recorded in the Pentateuch there may be insufficient historical foundation, but the deliverance from Egypt, his code of moral and social laws, his unwavering upholding of Jehovah as the one God, and his conquest of the land E. of Jordan, must be accepted as facts.

MOSES, ASSUMPTION OF, apocalyptic and pseudonymous book, rediscovered in 1861, perhaps identical with lost 'Testament of Moses'; probably written by a Pharisee about the time of Christ. It exists in Greek, which is perhaps translated from a Hebrew original.

MOSES OF CHORENE (fl. V. or VIII. cent. A.D.), Armenian historian; author of *Genealogical Account of Great Armenia*, down to 440—valuable as preserving ballads or traditions, but otherwise inaccurate; probably wrote the *Geography*, valuable for ancient Eastern names, etc., *Rhetoric*, and religious treatises.

MOSLEM. See MOHAMMEDAN RELIGION.

MOSQUE (word ultimately of Arabic derivation), term for a Mohammedan place of worship. A m. generally has an open space surrounded by colonnades. In the middle is a fountain, for Moslems must always pray ceremonially clean. There is likewise a niche to point the direction to Mecca, for thither a Moslem faces while praying. Though there is no sacerdotal caste in Islam, certain officials are appointed to supervise the m's. There are many famous m's now in existence, some built of the materials of ruined Christian Churches. An Indian m. always has a dome.

MOSQUITO COAST AND RESERVE (*c.* 13° N., 83° 50′ W.), district,

Nicaragua, Central America; formerly a separate state under Brit. protection now a department of Nicaragua, named Zelaya; surface mountainous in interior, low-lying near cost; capital, Bluefield. Pop. *c.* 15,000.

MOSQUITOES, flies grouped with gnats in family Culicidæ, having complex mouth parts for piercing and sucking blood in female, and thickly plumed antennæ in male. The larvæ are aquatic. Found over all the world, m's are of interest to man because some species are known to spread disease, especially malaria and yellow fever. See PARASITIC DISEASES.

MOSS (59° 26′ N., 10° 45′ E.), seaport, Norway, on Christiana Fjord; exports timber. Pop. 9200.

MOSS AGATE, or **MOCHA STONE,** a variety of agate which contains dark outlines resembling vegetable filaments.

MOSSAMEDES (15° 7′ S., 12° 15′ E.), seaport, chief town, Mossamedes district, Portug. W. Africa, on Little Fish (Mossamedes) Bay; exports cured fish. Pop. 5100; (dist.) 185,000.

MOSSEL BAY (34° 3′ S., 22° 15′ E.), seaport, bay, and division on S. coast, Cape Province, S. Africa. Pop. 4900

MOSSLEY (53° 31′ N., 2° 3′ W.), market town, Lancashire, England; cotton-mills, iron foundries. Pop. 1921, 12,705.

MOSTAGANEM (35° 56′ N., 0° 10′ E.), seaport, Oran, Algeria, Africa, near Mediterranean; trade in horses, cereals. Pop. 22,000.

MOSTAR (43° 25′ N., 17° 58′ E.), chief town, Herzegovina, Jugo-Slavia, on Narenta; seat of Gk. and R.C. bishopric; tobacco. Pop. 17,000.

MOSUL, tn., Mesopotamia (36° 19′ N., 43° 9′ E.), under Brit. mandate; on r. bk. of Tigris; flourished under caliphs; held in turn by Hamdanids, Okailids, Seljuks, Persians, Turks; encircled by partly ruined walls; contains great mosque; very prosperous and a great trading center 10th-13th centuries, when noted for manufacture of muslin; exports gall-nuts and mohair; oil wells discovered in the vicinity. Pop. *c.* 85,000. Mosul vilayet has area of 35,130 sq. m.; pop. *c.* 500,000. Under Turkey Mosul was an important military center, the station of an army corps, and during the World War a base of operations in the Mesopotamian campaign. In the weeks immediately before the Armistice (Oct. 30, 1918), the Turks were driven back along the road to Mosul, which was entered by the British without opposition. The control of Mosul was one of the disputed points at the Conference of Lausanne between the Great Powers and Turkey in 1923. Great Britain refused to relinquish possession of the territory, which is rich in oil.

MOTET, a term long applied to a composition, usually of a sacred character, for several voices. The form is now obsolete.

MOTHER CAREY'S CHICKEN, sailors' name for Stormy Petrel.

MOTHER OF PEARL, nacreous deposit with which molluscs coat interior of their shells; obtained by splitting shells into layers; largely used for inlaying, making buttons, pen-knife handles, etc.

MOTHERS' PENSIONS. See PENSIONS, MOTHERS'.

MOTHERWELL (55° 48′ N., 4° W.), town, Scotland; iron and steel works; collieries. Pop. 45,000.

MOTHS. See LEPIDOPTERA.

MOTION, LAWS OF. See DYNAMICS.

MOTION, PERPETUAL. See PERPETUAL MOTION.

MOTION PICTURES. See MOVING PICTURES.

MOTION PICTURES, COLORED. See COLOR PHOTOGRAPHY.

MOTIVE, any feeling or thought which helps to determine volition; sometimes, more particularly, the aim or end of action as determining volition. Thus fear may be called the m. which impels a man to run away, or his m. may be said to be to save his life.

MOTLEY, JOHN LATHROP (1814-1877), an American historian; *b.* in Dorchester, Mass. He graduated from Harvard University, in 1831, studied in Germany and was for a brief period secretary of the American legation in Petrograd, Russia. His first articles, most of them published in the North American Review, attracted little attention. During 1851-6 he was in Europe gathering the material for the work which made him internationally famous, *The Rise of the Dutch Republic,* published in 1856. In 1861 he was sent to Austria as U.S. Minister, where he remained until 1867. He was Minister to England in 1869, but was recalled the following year for reasons which have never become definitely known. His second great work, considered by many Dutch authorities better than his first, was *A History of the United Netherlands, from the Death of William*

the Silent to the Twelve Years' Truce, in 1609, 1860. He also wrote *The Life and Death of John of Barneveld, Advocate of Holland; with a View of the Primary Causes of the Thirty Years War*, 1874.

MOTON, ROBERT RUSSA (1867), an American Negro educator; *b.* in Amelia county, Va. He graduated from the Hampton Institute, in 1890, and for twenty-five years afterward was on the teaching staff of that institution. In 1915 he succeeded Booker T. Washington as principal of Tuskegee Institute. He has also been prominent in social organization work among the people of his own race in the United States. He has written two books, *Racial Good Will*, 1916; and an autobiography, *Finding A Way Out*, 1920.

MOTORCYCLE, a bicycle, the frame of which supports an internal combustion engine which is used for propulsion. Motorcycles have attained a high degree of efficiency and speed and were widely used in the World War for dispatch carrying and similar purposes requiring speed.

MOTOR BOATS. Small vessels usually under 65 ft. in length, when propelled by internal combustion engines are known as motor boats. The U.S. laws apply this term to all boats propelled by machinery not over 65 ft. except tug boats and tow boats propelled by steam. These laws divide motor boats into three clsses: (1) those less than 26 ft. in length; (2) those from 26 to 40 ft. long, and (3) those from 40 to 65 ft. long. Unofficially they are usually classified as follows: (1) motor launches, open or semi-open boats from 20 to 30 ft. long; (2) speed boats (sometimes called displacement boats), up to about 40 ft. long, characterized by high powered engines and usually decked over to prevent swamping by spray, etc.; (3) hydroplanes, with flat surfaces or planes on the under side of the hull to permit them to slide over the water rather than cut through like an ordinary boat. (4) cruisers with cabins and sometimes complete living quarters, entirely decked over and quite seaworthy. These are sometimes fitted with double or triple screws, and engines, up to about 300 H.P. The term motor boat is not applied to sailing vessels with an engine for auxiliary propulsion only.

The power driven small boat dates back to about 1885, when the marine type gasoline engine was conceived. Exhibits of motor boats were to be seen at the World's Fair at Chicago in 1893 and at The Paris Exposition in 1889.

For many years the general method of propulsion was hot air, naphtha vapor and 'Alco-vapor' engines. Electric launches deriving their power from storage batteries were used to some extent as early as 1890. This type is almost obsolete now, surviving only for short sight seeing trips on lakes, etc. The steam (engine) launch with a naphtha or gasoline heated boiler has also been superseded by the gasoline driven boat. However some steam launches are still in use by the Navy

MOTOR CAR. See AUTOMOBILE.

MOTOR TRACTORS are machines, driven by internal combustion engine for drawing heavy loads such as gang plows, reaping machines, snow plows, road grading machines, etc. They were developed from the steam-engine-driven tractors which made their appearance late in the 19th century. The first Motor Tractor was manufactured in Marion, Ohio, in 1898. It however was not as successful as its successors which have come into extensive use in the agricultural districts for doing much of the work formerly done by horses. A usual method of rating these machines is by the number of 14 inch plow bottoms they will pull. They are divided into three classes, according to the method used for obtaining traction, thus: (*a*) Flat Wheel Tractors, utilizing large diameter broad wheels, sometimes having treads of iron on their surface to increase traction. This is the simplest type, the power being transmitted to the wheels by a chain and sprocket or similar device. Three or four wheels are used, two driving wheels, and one or two steering wheels. (*b*) The Chain Tread Type, in which broad belts or chain treads, running over two wheels, and bearing upon the ground are used to carry all or part of the weight of the machine and to provide the necessary traction. One of the wheels is power driven, the other an idler. This type is steered by wheels, or in a manner similar to Caterpillar Tractors. (*c*) Caterpillar or Crawler type, which runs on a 'rail track' or crawler, driven by two sprocket wheels an idler and a power wheel. The driving and idler wheels carry no weight, rollers being used for the purpose. (See CATERPILLAR TRACTORS). The four cylinder, four cycle, water cooled engine, using kerosene or gasoline, is the standard prime mover adopted for the modern machines. High tension, magnetic ignition and impulse starters are to be found on the better grades. The carburetor air intake is fitted with a fine screen or an air washer to exclude dust.

MOTOR TRUCKS. A type of automobile of especially heavy construction, designed to carry large loads. The motive power is usually supplied by a gasoline engine, although some electric driven storage battery types are still used for short hauls. The latter are usually referred to as 'Electric Trucks'. The use of automobiles for the hauling of freight, etc., began soon after the practical development of the passenger automobile. At this time it was general practice to use a heavy type of automobile, similar to a passenger car, but fitted with a truck body. This was commonly called an 'Auto-Truck', a name which still persists in general usage to some extent; the correct term, as agreed upon by the manufacturers, is however, 'Motor Truck'. It was many years after the appearance of the auto-truck that it was realized that passenger car design was not the most efficient for a truck. During this time the electric truck came into general favor, and proved itself efficient for short hauls, probably because it was properly designed for the purpose. The necessity of rapidly transporting supplies, etc., for the mobilization and maintenance of the large armies in the late war gave the stimulus required to bring the design and manufacture of trucks to their present high state of development. In the present design, heavy duty, slow speed engines and heavy power transmissions predominate. The chain drive so widely used in the early models is giving place to the internal gear and worm transmission. The wheel base is constantly being lengthened. The four cylinder engine has been adopted by the majority of the manufacturers. It is interesting to note, however, that the two cylinder opposed type engine (a practically obsolete type) is still successfully employed by one manufacturer. The rated carrying capacity of the largest commercial truck is 10 tons, utilizing a 40 H.P. motor. The motor H.P.'s for the smaller sizes are approximately 1½ ton-20 H.P.; 2-2½ ton-25 H.P.; 3½ ton-32 H.P.

MOTORS, DIRECT CURRENT. See DIRECT CURRENT MOTORS.

MOTORS, ELECTRIC. The distinction between an electric dynamo and an electric motor is simple; in the dynamo, mechanical energy is supplied to the machine and electrical energy is given out by it; in the motor, electrical energy is supplied and mechanical energy is given out. Thus the dynamo is driven by some source of power external to itself and furnishes current for lighting, heating, etc., while the motor has current led into it and itself drives machines or does other mechanical work.

So far as constructional design is concerned, the dynamo is almost exactly similar to the motor. In the dynamo a coil of wire is made to rotate between the poles of an electro-magnet in such a way that the number of lines of magnetic force passing through the oil is constantly changing; an electric current is thus generated in the coil, picked up by the brushes, and delivered to the external circuit. Exactly the opposite procedure takes place in the motor. The current is led into the machine from an external circuit, and conveyed to the armature coils, which are thereby set in motion, causing the armature to revolve between the poles of the electro-magnet. The moving part of a motor is known as the rotor, the stationary part as the stator.

This current applied to motors is generally taken from the public mains or some other large source of supply, and is therefore at a practically constant pressure. Let this pressure be E volts. As soon as the motor begins to revolve, there is set up a back electromotive force which acts in opposition to the constant E.M.F. of the circuit. Let this back E.M.F. be e volts. If, now, the total internal resistance of the machine be R, then by Ohm's law the current flowing round the coils will be $(E-e)/R$. Since the back E.M.F. is proportional to the speed of rotation of the moving parts, it follows that, at the moment of starting, the term e in this formula is negligible, and hence the current is then at its maximum. To avoid damage to the machine owing to this heavy current, a special starting switch is employed, which inserts a large resistance that is gradually cut out as the speed of the motor rises. The maximum rate of revolution which may be attained is that at which the back E.M.F. nearly reaches the voltage applied to the brushes, a sufficient difference being allowed to overcome the internal resistance of the wires. In well-designed machines this quantity is always small.

The effect of putting a load on a motor is naturally to diminish the speed. But as the speed decreases the back E.M.F. falls off, with the result that the current increases in strength and the machine is thus enabled to overtake the work. The limit of the motor's power is reached when the impressed load is so great that the increased current is not strong enough to set the moving parts in motion. The electrical efficiency of the machine is the ratio of the energy output of the motor to the total energy supplied to it.

Like dynamos, motors are series, shunt, or compound wound according to the work which they are intended to do. Shunt wound motors are useful where steady running at uniform speed is required, since a change of load within certain limits causes little variation in velocity in their case. Series winding may be employed where frequent and rapid starting is required. It is well suited to tramways, cranes and motor cars, but is open to the objection that it develops very high speed with light loads. For general purposes compound winding has many advantages. The shunt helps to steady the speed, and the series coils give additional power on starting or on heavy loads.

Gasoline motors are a particular class of internal combustion engines.

Water motors are machines designed for the application of water-power to mechanical purposes. They fall naturally into two-classes—viz., water-wheels and turbines.

MOTRIL (36° 53′ N., 3° 37′ W.), town, Granada, Spain, near Mediterranean; sugar. Pop. 20,000.

MOTT, JOHN RALEIGH (1865), an American Y.M.C.A. official; *b.* in Livingston Manor, N.Y. He graduated from Cornell University, in 1888, after which he became student secretary of the International committee of the Young Men's Christian Associations. In 1898 he became foreign secretary of this body, and since 1915 he has been its general secretary. In 1916 he was appointed a member of the Mexican Commission by President Wilson and in 1917 he was a member of the special diplomatic mission sent to the Kerensky Government of Russia. During the war period he served as general secretary of the National War Work Council of the Y.M.C.A. He has written *Strategic Points in the World's Conquest*, 1897; *Evangelization of the World in This Generation*, 1900; *The Decisive Hour of Christian Missions*, 1910; *The Present World Situation*, 1914 and *The World Student Christian Federation*, 1920.

MOTT, LUCRETIA (1793 - 1880), Amer. Quaker reformer; preached as member of Society of Friends, denouncing slavery and urging peace; took an active part in anti-slavery and women's suffrage conventions.

MOTT, VALENTINE (1785 - 1865), Amer. surgeon; prof. of Surgery at Columbia Coll., 1809; after seven years in Europe founded Univ. Medical College of New York, 1841; famed as a brilliant operator.

MOTTL, FELIX (1856-1911), an Austrian composer and musical conductor; *b.* in Vienna, Austria. He graduated from the Vienna Conservatory with honors and in 1881 became leader of the court orchestra at Karlsruhe. In 1886 he conducted at Bayreuth. Later he returned to his former post in Karlsruhe, but went to Munich in 1903. His fame rests on his two operas, *Agnes Bernauer*, 1880; and *The Prince and the Singer*, 1893.

MOUFLON, MUFLON (*Ovis musimon*), wild sheep of Central Asia; in Europe found only in Corsica and Sardinia.

MOULDING. See FOUNDING.

MOULD, a general unscientific name for a variety of thread-like fungi, which in the presence of damp attack many kinds of animal and vegetable substances. *Penicillium glaucum* and *italicum*, the blue, green, or brown Ms. of oranges and other fruit, can only gain a hold when the skin or rind of the fruit has been slightly damaged.

MOULINS (46° 33′ N., 3° 20′ E.), town, Allier, France, on Allier; cathedral; bp's see; machinery, furniture; was ancient capital of Bourbonnais. Pop. 23,000.

MOULT, the casting of an external coat; most often used of the shedding of feathers, but also of hair, or scales, of the Carapace in crustacea, or of various cuticles in other Arthropods.

MOULTRIE, a city of Georgia, in Colquitt co., of which it is the county seat. It is on the Atlanta, Birmingham and Atlantic, the Flint River and Northeastern, the Georgia and Florida, and other railroads. It has important industries including meat packing, manufacture of mattresses, fertilizers, lumbering and cotton. The public buildings include a library and a government building. Pop. 1920, 6,789.

MOULTRIE, FORT, one of the defenses of Charleston Harbor, South Carolina, situated on Sullivan's Island. It was built in 1776 by Colonel William Moultrie (*q.v.*) and in that year resisted the massed attack of a British fleet and land force. It was from this fort that Fort Sumter was bombarded on Dec. 20, 1860, signalizing the opening of the Civil War. The Confederates afterwards used it in defending Charleston against the Union forces.

MOULTRIE, WILLIAM (1731-1805), revolutionary general; *b.* Charleston S. C. He was an officer of colonial troops who defended the frontier against the Cherokees in the war with that tribe in 1761. The Revolution found him

colonel of a South Carolina regiment and building forts round Charleston, one of which was Fort Moultrie, which he successfully defended from a British attack by sea and land. Later he commanded the forces of South Carolina and Georgia. In 1780 the British attacked Charleston again and this time compelled Moultrie, who commanded the besieged Americans, to surrender. They held him prisoner for two years, his release being effected by an exchange for Burgoyne (*q.v.*). After the war he was twice governor of South Carolina.

MOULMEIN. See MAULMAIN.

MOUND BIRDS, or **MOUND BUILDERS** (*Megapodes*), a remarkable family of gallinaceous birds, which are so-called on account of their habit of throwing up large mounds of vegetable matter in which they deposit their eggs, and after covering them up leave them to be incubated by the heat produced by fermentation. In some cases the mounds are co-operative. The species number only about twenty, and are characterized by very large feet, short tail, and crested head. A familiar example is the brush turkey (*q.v.*)

MOUND BUILDERS. Believed to have been the precursors, or ancestors of the North American Indians, whose earthworks, mounds, and forts are numerous in Ohio, the Mississippi basin and elsewhere in the United States. Those in the South are flat-topped erections that bear a resemblance to ancient Mexican structures. Animal shaped mounds are found in Wisconsin and Illinois, in the territory of the Winnebago Siouans. The largest structure is Fort Ancient, Warren county, Ohio, which is a mile long and contains ten miles of artificial work. Important groups are located at Chillicothe as Hopewell, Hopeton, and Mound City. These are mostly burial mounds which have been found to contain human bones, earthenware, flints, and hand-wrought metal work.

MOUNDSVILLE, a city of West Virginia, in Marshal co., of which it is the county seat. It is on the Baltimore and Ohio Railroad, and on the Ohio River. It is the center of an important agricultural and mining region and its industries include the manufacture of glass, lumber, brick, clothing, foundry products, leather, etc. Within the city limits is one of the famous mounds of prehistoric origin. From this the city takes its name. It is the site of the State Prison and has court-house, Federal building and a memorial hospital. Pop. 1920, 10,669.

MOUNT BARKER (35° 5′ S., 138° 58′ E.), town, S. Australia, at foot of Mount Barker; agricultural and fruit-growing district.

MOUNT CARMEL, a city of Illinois, in Wabash co., of which it is the county seat. It is on the Cleveland, Cincinnati, Chicago and St. Louis, and the Southern railroads, and on the Wabash River. The industries include railroad shops, and the manufacture of ice, lumber, flour, etc. The city is the trade center of an important agricultural region. The public buildings include a court-house, high school and a library. Pop. 1920, 7,456.

MOUNT CARMEL, a borough in Pennsylvania, in Northumberland co. It is on the Philadelphia and Reading, the Lehigh Valley and the Northern Central railroads. In the neighborhood are important anthracite coal mines and the industries of the city are chiefly connected with mining. Pop. 1920, 17,469.

MOUNT CLEMENS, a city of Michigan, in Macomb co., of which it is the county seat. It is on the Grand Trunk Railroad and on the Clinton river. Within the city limits are medicinal springs and for this reason and on account of its beautiful site, it has become in recent years a favorite summer and health resort. The public buildings include a library and several large hotels. The industries include the manufacture of beet sugar, carriages, automobiles, typewriters, and agricultural implements. Pop. 1920, 9,488.

MOUNT DESERT, an island in the Atlantic Ocean, off the coast of Maine, and belonging to Hancock co. Here was made one of the earliest settlements in the history of the United States by the French, in 1608. The island is 14 miles long and 7 miles wide and is divided into two parts by Soames's Sound. The summer resorts of Bar Harbor, Northeast and Southwest Harbors, Soamesville, Seal Cove, and East Eden are villages on the island. There are many beautiful lakes and Mount Desert is one of the most popular summer resorts in the United States. Pop. about 2,000.

MOUNT GAMBIER (37° 50′ S., 140° 50′ E.), town, S. Australia; agricultural center.

MOUNT HOLLY, a town in New Jersey, in Burlington co., of which it is the county seat. It is on the Pennsylvania Railroad and on Rancocas creek. Its industries include the manufacture of shoes, machine shop products, foundry products, leather goods, etc. It has a

Children's Home, Burlington County Hospital, and the Burlington County Lyceum. Pop. 1920, 5,945.

MOUNT HOLYOKE COLLEGE, a non-sectarian seat of learning for women, situated at South Hadley, Mass. It was founded as a female seminary in 1836 and became a college in 1893. The curriculum is divided into two years of obligatory and two years of elective studies and includes physical training. The college is identified with the American Schools of Classical Study in Rome and Athens. In 1922 there were 795 students and a teaching staff of 128 under the direction of Mary E. Woolley.

MOUNT M'KINLEY. See McKINLEY, MOUNT.

MOUNT MORGAN (23° 45′ S., 150° 30′ E.), town, Queensland, Australia; gold mines. Pop. 6500.

MOUNT OLIVER, a suburb of the city of Pittsburgh, in Allegheny co., Pennsylvania. Pop. 1920, 5,575.

MOUNT PLEASANT, a town of New York in Westchester co. It is on the New York Central and Hudson River Railroad, and on the Hudson River. It includes a number of villages. Within the city are the Westchester County Hospital, St. Joseph's Normal School and other private educational schools and hospitals. There are important industries including the manufacture of automobiles. Pop. *c*, 5,000.

MOUNT PLEASANT, a borough of Pennsylvania, in Westmoreland co. It is on the Baltimore and Ohio and the Pennsylvania railroads, and is the center of an extensive coke making industry. It has also plants for the making of flour, iron products, foundry products, glass, etc. It is the seat of the Western Pennsylvania Classical and Scientific Institute. Pop. 1920, 5,862.

MOUNT STEPHEN (GEORGE STEPHEN), 1ST BARON (1829-1920), Canadian banker and railway magnate; was born at Dufftown, Banffshire, Scotland; emigrated to Canada, 1850, and became director and president of Bank of Montreal; was associated with Lord Strathcona, his cousin, in various railway enterprises, and was first president of St. Paul, Minneapolis, and Manitoba Ry,, and of the Canadian Pacific Ry. till 1888. He was one of the greatest philanthropists of modern times; was created a baronet, 1886, and raised to the peerage, 1891.

MOUNT UNION COLLEGE, co-educational, situated in Alliance, Ohio, was founded as a seminary in 1846 under the auspices of the Methodist Episcopal Church. In 1922 it had 447 students and a teaching staff of 26 headed by W. H. McMaster.

MOUNT VERNON, a city of Illinois, in Jefferson co., of which it is the county seat. It is on the Louisville and Nashville, the Chicago and Eastern Illinois, and other railroads. Its industries include coal mining and the making of machine shop products, glass, hosiery, etc. The public buildings include a court-house and a library. There is also a city park. Pop. 1920, 9,815.

MOUNT VERNON, a city of Indiana, in Posey co., of which it is the county seat. It is on the Louisville and Nashville and the Chicago and Eastern railroads, and on the Ohio River. Its industries include the manufacture of flour, lumber, engines and foundry and machine shop products. It has also important agricultural interests. The public buildings include a court-house and a library. Pop. 1920, 5,284.

MOUNT VERNON, a city of New York, in Westchester co. It is on the New York Central and Hudson River, the New York, New Haven and Hartford, and the New York, Westchester and Boston railroads, and on the Bronx river. The city is an important industrial community. It is, however, chiefly a residential suburb of New York City. It has a public library, a hospital, and many handsome private and public buildings. The city includes the suburb of Chester Hill, formerly a village of Mount Vernon and part of the town of Eastchester. The town is built on a high elevation and commands an excellent view of Long Island Sound. Pop. 1920, 42,726.

MOUNT VERNON, a city of Ohio, in Knox co., of which it is the county seat. It is on the Pennsylvania and the Baltimore and Ohio railroads, and on the Kokosing river. It is the chief trade center of an extensive agricultural region. Its industries include locomotive works, foundries, furnaces, engine works, woolen mills, flour and sawmills, etc. The plant of the Corliss engine works is here. Pop. 1920, 9,237.

MOUNT VERNON, the former estate of George Washington, in Fairfax co., Virginia. It is on the right bank of the Potomac River, 15 miles S. of Washington. The house, which is still in an excellent state of preservation, is of wood, 96 feet long, built on a bluff 200 feet above the river of which it commands an excellent view. The estate was originally called Hunting Creek and comprised 800 acres. It

was inherited by Washington from his brother Lawrence, in 1752. The name had in the meantime been changed to Mount Vernon, in honor of Admiral Vernon of the British navy, under whom Lawrence Washington had served. The center of the house was built by him, and the wing was added by George Washington. The house and 200 acres of land surrounding it are the property of the Mount Vernon Ladies' Association, who purchased it in 1859 for $200,000, largely through the efforts of Edward Everett. It has been restored as nearly as possible to the condition in which it was during President Washington's lifetime. Near the house is the plain brick tomb of Washington, containing also the remains of his wife Martha. The house contains many objects of historical interest, including the key to the French Bastille, which was sent to Washington after the French Revolution. Mount Vernon is a favorite place of pilgrimage with eminent visitors from foreign countries, and it has become the custom to place a wreath on the tomb of Washington.

MOUNT WASHINGTON, the highest peak of the White Mountains of New Hampshire, rising in the Presidential range nearly in the center of the peaks. It is mostly granite and almost 6300 feet in elevation. The summit, which is too rocky to bear much vegetation, is reached by a rack-and-pinion railway, and a United States meteorological station and a hotel are situated upon it. The slopes and base are well forested.

MOUNT WILSON SOLAR OBSERVATORY is situated nine miles from Pasadena, Cal., on the summit of Mount Wilson, one of the peaks of the Sierra Madre. It is supported by the Carnegie Institution.

MOUNTAIN ASH (51° 40′ N., 3° 28′ W.), town, Glamorganshire, Wales; collieries; ironworks. Pop. 1911, 43,000.

MOUNTAINEERING is a comparatively modern sport, although celebrated climbs have been recorded since the XIII. cent., and Gesner and Simler, XVI. cent., showed that there were some who took keen pleasure in climbing. It did not become popular till about 1750; Mont Blanc was first ascended by Balmat, 1786, who guided De Sassure on his famous ascent in the following year. In 1800 some peasants climbed Gross-Glockner. The Alpine Club was formed in 1857 and the *Alpine Journal* first published, 1863. Among famous climbers may be mentioned, Whymper, who climbed the Matterhorn 1865 and various peaks of the Andes, Mackinder, who scaled Mt. Kenya, 1899, and the Duke of Abruzzi, who has made several celebrated climbs in E. Africa. Hudson Stuck who ascended Mt. McKinley

MOUNTAINS. In a typical mountain range certain features are always present. It consists not of a single ridge, but of a chain of elevations; and in the greater mountain systems many subordinate ranges may be present, running nearly parallel to one another. The axial ridges are usually the highest. The higher peaks are mostly bare and rocky; around them lie the snowfields from which the glaciers take their rise. At lower elevations the rocks are covered with a close growth of Alpine plants and short grass; still lower down trees make their appearance, at first stunted and scattered, but soon in dense thickets. Each altitide is marked by a characteristic climate and fauna. The heights are separated by valleys, which may run parallel to the axis, or nearly at right angles to it; transverse valleys often afford the easiest passes by which the mountains may be crossed.

The following are the chief mountain peaks, with heights in feet: *Europe*, Mont Blanc, 15,782; *Asia*, Everest, Himalayas, 29,000; Dapsang, Karakorum Mts., 28,250; Tagarma, Pamir, 25,360; *Africa*, Kilimanjaro, 19,200; Kenya, 17,007; Ruwenzori, 16,815; *America*—(1) N., Mt. M'Kinley, 20,464; Mt. Logan, 19,515; Orizaba, 18,250; (2) S., Aconcagua, 23,080; Mercedario, 22,302; Gualatieri, 22,000; *Oceania*, Mt. Charles-Louis, New Guinea, 20,000; Mauna Kea, Hawaii, 13,805; Mt. Cook, New Zealand, 12,349; Mt. Kosciusco, New South Wales, 7,336; *Antarctic Regions*, Mt. Erebus, 12,760.

MOUSE FAMILY (Muridal), a vast assemblage of rodents comprising almost 1,500 species, recorded from practically all parts of the world. They have slender skeletons, four and five toes on the fore and hind feet respectively, sharp flattened lower incisors, and a long scaly tail generally almost devoid of hairs. Most familiar are rats and mice (*Mus*), five of which occur in Britain, leading nocturnal lives and sheltering in holes: the disappearing black rat or ratton (*M. rattus*), almost exterminated by the spread of the larger and fiercer brown rat (*M. decumanus*); the common house-mouse (*M. musculus*) and its country relatives, the harvest-mouse and long-tailed field-mouse (*M. minutus* and *sylvaticus*), the former of which builds a nest among corn stalks. The voles (*Arvicola*) are more clumsy than rats and mice, have shorter tails and ears, are entirely vegetarian, and are even more destruc-

tive to crops. Representatives of the mouse family are the volelike lemmings (*Lemmus*), found burrowing in the mountains of N. Europe, Asia, and America. The musk-rat or musquash (*Fiber*) is an aquatic inhabitant of N. America, with a musky odor, and fur of commercial value; while the graceful, bushy-tailed gerbils live in burrows on the sandy deserts of Europe, Asia, and Africa, resembling in habit the Old World cheek-pouched hamsters (*Cricetus*).

MOUTH, the entrance to any cavity or canal; in particular, the entrance to the alimentary canal between the lips, including the cavity in which mastication takes place. The *lips* are folds of flesh composed of skin, areolar tissue, or superficial fascia, the orbicularis ovis muscle, submucous tissue, and mucous membrane. The *cheeks* are similar in structure, except that they are actuated by the buccinator muscle, which compresses the cheek and retracts the angle of the lips. The opening of the duct from the parotid gland is situated on the M. side of the cheek opposite the second upper molar tooth, while other salivary ducts are situated on the same surface. The *gums* are composed of mucous membrane superposed upon fibrous tissue connecting with the periosteum of the jaw-bone. The *teeth* are fixed in the gum and jaw-bone, and the mucous membrane of the gum rises up round each tooth. The roof of the M. is formed by the hard and soft palate. The *hard palate* consists of mucous membrane and fibrous tissue connecting with the superior maxillary and palatal bones; the *soft palate* is composed of an aggregation of muscles.

MOVING PICTURES, a form of entertainment which has been made possible by the invention of the cinematograph. It was not until about 1900 that the pictures thrown on the screen could be given the movement of life, and then only brief scenes were presented, such as a glimpse of marching troops or a galloping horse. It was not till a year or two later that the possibility of embodying dramatic incident in the moving pictures was suggested. One of the first to carry this idea into effect was Lubin, a Philadelphia photographer, who erected a studio in his back yard and hired actors to present certain scenes carrying a story. Usually these were of a comic nature, such as a fat man being pursued by a crowd of people, these scenes having no plot or dramatic thread. Lubin's scenes were presented at vaudeville theatres with great success, and from these developed the screen drama. In France the Pathé Fréres were following a parallel course, and meeting with similar success. Other producers appeared, and within a few years complete, well constructed dramas were enacted by means of the moving pictures on the screen. For many years there was a strong prejudice on the part of the members of the theatrical profession against appearing in this new form of theatrical production, but when such famous foreign artists as Sarah Bernhardt began being featured in screen productions, that prejudice soon disappeared. Practically every prominent Amer. actor or actress has since been presented through moving pictures. Moving pictures, however, have created a separate group of artists, actors who have become notable through their moving picture work, such as Mary Pickford, Charles Chaplin and Douglas Fairbanks. These had been on the stage before their appearance on the screen, but had attracted no attention. They belong to a class so large as to indicate that the talents demanded by the two forms of acting differ, or possibly that certain defects which handicap the stage actor do not operate in the moving picture studio. This is especially true of the voice. Two important centers of moving picture production have developed in this country; one in the East, around New York, the other in the West, centering in Hollywood, Cal. Most of the Eastern studios are established in Fort Lee, N.J., a suburb of New York, but since 1921-2 these have given way in importance to the Hollywood studios. A notable feature of moving picture production has been the tremendous cost to which competition has led producers in producing their pictures. In some cases over a million dollars have been spent in staging the scenes of one production, such as 'The Birth of a Nation' and 'The Fall of Babylon,' and it is quite common for a company of from ten to a hundred actors to be transported to distant points in foreign countries for the purpose of taking scenes in realistic setting. This peculiar development has made it impossible for small capital to enter into the field, and the result has been something in the nature of a trust, or at least control among a very few large corporations. In 1923 there were about 200 film producers in the United States in the purely dramatic field. The producers are also beginning to take over the functions of the exchanges, through which films are retailed to the exhibitors. In 1923 there were about 20,000 moving picture show houses in the country. The tendency is in the direction of larger show houses and higher prices.

MOVING PLANT, or **TELEGRAPH PLANT** (*Desmodium gyrans*), an Indian plant (order Leguminosæ) with pinnate leaves, the leaflets having a rapid up and down rotatory movement especially in sunshine. It bears violet flowers, and is sometimes grown in the stovehouse.

MOZAMBIQUE, MOÇAMBIQUE (15° 2′ S., 40° 48′ E.), seaport, Portug. E. Africa, on island in Mossoril Bay; exports ground-nuts, rubber. Pop. 5,000. The name is also given to a district of Portug. E. Africa and to Portug. E. Africa itself.

MOZAMBIQUE CHANNEL, a channel between the E. coast of Africa and Madagascar. Length about 1000 m., breadth from 260 to 600 m.

MOZART, WOLFGANG AMADEUS (1756-91), Austrian composer; *b.* at Salzburg; *d.* in Vienna. His musical precocity was phenomenal, and when, at the age of six, he started on a three years' artistic tour with his sister, he excited astonishment everywhere as the 'wonder-child.' At Paris, in 1763, during this tour, his first compositions were published. Returing to Salzburg he wrote, when only ten, an oratorio, and soon after an opera, performed in 1769. In Vienna he wrote, among others, the three great operas by which he will always be remembered, *The Marriage of Figaro*, 1786; *Don Giovanni*, 1787, and *The Magic Flute*, 1791. During his brief life M. wrote no fewer than 769 compositions, ranging from the very largest to the simplest forms.

MOZDOK (43° 45′ N., 44° 30′ E.), town, Terek, Russia, on Terek. Pop. 15,500.

MTZENSK, MZENSK (53° 17′ N., 36° 30′ E.), town, on Zusha, Orel, Russia; tallow, soap; active trade. Pop. 10,500.

MUCILAGE, an aqueous solution of a gum; some gums form a clear solution in water, while others swell up to form a sticky viscous liquid, more properly called mucilage. The Ms. are used in the arts as adhesive substances, to thicken and stiffen cotton fabrics, etc.; and in medicine as emollients or demulcents.

MUCIN, a complex substance found in various parts of the human body; a constituent of saliva, gastric juice, bile, and urine; it contains proteid and carbohydrate, and helps in the digestion of sugar.

MUCUS, a term denoting various substances consisting chiefly of horny-like substances detached from the mucus surfaces and floating in a peculiar viscid clear fluid. In some cases these secretions are altered and become albuminoids, etc. Mucous infections are mucin, an inflammatory product in mucous cysts, mucous laryngitis, polypi, softening tumors, etc. In botany mucous is a gummy matter soluble in water.

MUD, a term employed for the impalpable argillaceous matter which settles in quiet waters. When consolidated and devoid of lamination, it is known as mudstone. The dark blue muds of the sea bottom derive their color from decomposing organic matter and sulphide of iron, while the green muds are so colored from the glauconite grains which they contain. Near coral reefs the sea floor is covered with white M. due to the abrasion of coral, while round volcanic islands a grey M. formed from degraded volcanic rocks is found.

MUD BATH, a bath taken in the mud transfused with saline or other ingredients. It is a valuable remedy for rheumatism and similar ailments. There are famous mud baths in the United States and Europe.

MUDFISH, or **BOWFIN** (*Amia calva*) a fish occurring in the N. American lakes and rivers which has the air-bladder highly developed as a lung sac, so that it can live out of water for a long time. It is about 30 in. long, and a dark mottled green. It feeds voraciously upon crustaceans and insects, but its flesh is soft and ill-flavored.

MUDHOL (16° 20′ N., 75° 20′ E.), native state, S. Mahratta agency, Bombay, India. Pop. 70,000.

MUDROS, vil., Lemnos I., Ægean Sea (39° 51′ N., 25° 17′ E.). Mudros Bay as the sea base of the Brit. forces during the Gallipoli campaign (April-Dec, 1915). Turks signed Armistice at Mudros (Oct. 30, 1918).

MUEZZIN, or **MUEDDIN,** a Mohammedan official whose duty it is to announce the hours of prayer to the faithful. This he does from the minaret or side of the mosque in a nasal chant. His call is as follows: 'Allah is great (three times). I testify that there is no God but Allah (twice). I testify that Mohammed is the apostle of Allah (twice). Come to prayer (twice). Come to the best of works (twice). There is no God but Allah.'

MUFFLE, an arched vessel, used in metallurgy, which is constructed to be placed over cupels and tests in the operation of assaying. It preserves them from contact with ashes, smoke, etc., but does not hinder the action of the

fire on the metal nor prevent inspection. The furnace for firing porcelain, etc. is called a muffle furnace.

MUFFLING, FRIEDRICH KARL FERDINAND VON, WEISS (1775-1851), Pruss. field-marshal; chief of staff of Tolly and Nollendorf in invasion of France, 1814; chief of general staff at Berlin, 1821; reorganized staff and wrote important military works.

MUFTI (Arabic, *expounder of the law*). The Turkish Grand Mufti is the supreme head of the Ulemas (servants of religion and laws), and with the Granz Vizir has the supreme guidance of the state. The Turkish laws being based on the Koran, the Mufti, as head of the judges, is the chief spiritual authority, and is therefore sometimes known as Sheikh-al-Islam (Lord of the Faith).

MUGGLETONIANS, Eng. religious sect, founded, 1652, by Lodowick Muggleton (1609-98) and John Reeve; preached damnation of all outside the sect.

MUGWUMP, originally an American political slang word applied, in 1889, to those of the Republicans who would not vote for the candidature of J. G. Blaine for the presidency.

MUHAMMAD, MOHAMMED, MAHOMET (*c.* 575-632), the prophet and founder of Mohammedan religion, was *b.* at Mecca. He belonged to the tribe Koreish, and was of good family. Arabia in his time was pagan, but various religions had exerted some influence. M. was married about 595, and his 'Call' took place about 610. He seems to have projected preaching against idolatry, restoring Judaism to its patriarchal purity by combining Jewish and Christian elements. He recognized the Old Testament prophets and Christ, and regarded himself as the last and greatest prophet. Only by degrees did he assert his claim. The Koran, of which the author, according to Moslem orthodoxy, was not M. but God, was delivered to the prophet in *Suras* (chapters), and written down by his followers. These were afterwards collected into the Koran as we have it. Meanwhile, M. was gathering round him a band of followers, including his wife, his cousin, and his successor as head of the new religion—Abê Bekr.

When M. began his public ministry he had a firm nucleus of supporters who may have urged him to keep in retirement no longer. The exact sequence of events from this time (about 616) to the Flight, in 622, is uncertain, but something may be gathered. He seems to have been involved in controversy about the Koran, in which he claims to have described events of which he had no ordinary means of knowledge, though his enemies said they knew a man who was his source of information. Although it became the standard for Arabia, some scholars think they can detect Ethiopic idioms in it. Meanwhile, M. had to face opposition in Mecca, and, while personally safe, was obliged to secure a refuge for some of his followers in Axum, in Abyssinia, making an alliance with the Abyssinian king. M. received an invitation from Yathrib (afterwards called Medina) to come to the assistance of one tribe which was at war with another. The Meccans were naturally roused against M., and the safe execution of his plan of escape taxed all his ability. He concealed himself in a cave south of Mecca, and finally arrived at Yathrib, Sept. 20, 622. From this time onwards M. wielded greater and greater power. He failed to bring about any understanding with the Jews in Yathrib, and he crushed them by force of arms. He forbade the drinking of wine by his followers—perhaps because of its associations with the Christian Eucharist.

The new faith spread beyond Medina, and all that was required of converts was to declare belief in God and in M. as His prophet, and to pay a certain sum as tribute. M. was naturally on bad terms with the Meccans, and he started making attacks on their caravans. A battle was fought at Badr, in which M. was victorious. This greatly increased his reputation throughout Arabia. Another battle, however, was fought, in which he was defeated. In the year 5 A.H. (of the new era, reckoning from the Flight), Mecca was invaded, a truce was made next year, and in 6 A.H. it was captured. Little change, however, was made in its internal government. The next step was the subjugation of Arabia. None but converts were allowed in his army. He sent messages to all monarchs he knew, urging them to embrace the new faith. In 9 A.H. the encroachment of Islam on the Byzantine Empire had begun, and before his death he had planned the reduction of Syria.

MUHAMMADANISM. MOHAMMEDANISM, Mohammed taught that the Creator rules the universe with love and mercy; He alone is to be worshiped; in Him confidence is to be placed in time of adversity. There must be no murmurings at His decrees; life your own and others, dearer than your own, must be placed in His hands, in trust and love. The fatalism which has come to be regarded as part of the Moslem creed

had no place in the system established by Mohammed, who again and again distinctly and emphatically repudiated the idea. Mohammed taught reform, not revolution. Although the idolatry of Arabia was polytheistic, the first part of a formula which has since become the watchword of the Mohammedan faith was but the echo of a prayer common enough among the pagan devotees at the Kaaba.

Once Mohammed was safely established at Medina, there was a departure from the broad philanthropic lines of the original message. The power of success, the zeal of fanatics, and political considerations, while popularizing the creed, ultimately led to that exclusiveness, intolerance, and bigotry which have become such marked features of the faith of Islam. The 'Messenger of God' laid down a plan of salvation based on ceremonial law. Fasts and festivals were proclaimed; stress was laid on pilgrimages, and special blessings were attached to a pilgrimage to Mecca. Later revelation changed the attitude of the 'faithful' towards Christians and Jews from one of friendship and toleration to one of aggression and persecution. Captive women were condemned to slavery or concubinage; polygamy was not only countenanced but encouraged. Almsgiving, the condemnation of usury, and the prohibition against the use of intoxicants are the few redeeming features of a retrogression, in spite of which the creed spread until before Mohammed's death, in 632, all Arabia acknowledged his spiritual and temporal supremacy.

Under the caliphate of Ali, son-in-law of Mohammed, the 'Bayard of the Faith,' we catch the first note of Mussulman dissent. The church was rent into two great factions—the Shiites and the Sunnites. The former look upon the three caliphs who reigned between Mohammed and Ali as usurpers; the latter recognize no divine right of succession, and claim for the 'faithful' free choice in the selection of their spiritual leader. Ali was assassinated in 660, and his eldest son, Hassan, who resigned in less than six months, in favor of his father's rival, was subsequently poisoned by one of his wives. Then, in disgust at the licentiousness of the usurper, Ali's youngest son, Hosein, was invited to become caliph. Hosein set out from Mecca with his nearest relations to join his adherents on the Euphrates. On the plain at Kerbela his small band was surrounded and destroyed by 3,000 of the enemy. Hosein was buried where he was slain, and Kerbela has since become the necropolis of the Shiites—a second Mecca. Only one of Hosein's twelve children escaped this massacre, and it is through this man, Ali, surnamed Zayn-el-Abidin, that the pontiffs of what is known as the orthodox Mussulman church claim succession. The death of Hosein widened the breach between the rival sects, and on the *Moharram*—the days of mourning set apart to commemorate the martyrdom of Ali and his two sons—the Shiites and the Sunnites have often met in deadly conflict. There are other sections of the faith, of which the Sufis, Wahabis, and Dervishes are the most important.

The diffusion of Islam gave rise to many complex religious, social, and administrative questions which the Koran did not quite solve; hence we have the Sunnat or 'traditional law'. But the collections of Sunnats, compiled by the Shiites and the Sunnites respectively, are not only at variance with one another, but often are antagonistic. To meet points on which both Koran and Sunnat fail to produce an exact pronouncement, reference is had to the Ijma, which may be briefly described as the *dicta* of the 'fathers of the faithful'. And lastly, there are the Kias—the reasonings or deductions to be gathered upon consideration of one or all of the three writings already referred to. These four books constitute the foundations of Moslem faith.

MUHAMMADAN LAW is part of the Mohammedan religion. It arose from Arab customs and usages as reformed and extended by Mohammed. History of Islamic legal system is divisible into four distinct periods:—(1) Legislative, commencing with Hijrat (Hegira) or Prophet's Flight to Medina, A.D. 622, and ending with his death, A.D. 632: laws divinely revealed, and promulgated in the Koran, and in *Hadith* or Traditions, inspired precepts of Mohammed. (2) From A.D. 632 to 8th cent. A.D.: period of collection and interpretation. (3) from 8th to 10th cent. A.D.: foundation of the four Sunni schools of jurisprudence—Hanifite, Mālikite, Shafi'ite, Hanbalite—differing chiefly in details. (4) From 10th cent. A.D. to present time: development of previous work. Islamic law regulates entire public and private relations of Moslems mutually and with non-Moslems. Among more interesting legal institutions are *waqf*—transference of usufructuary rights without property vesting in any individual; *jehad*—religious war declarable against hostile non-Moslem state; inheritance laws, highly scientific and equitable; marriage laws, permitting four wives, but entitling each to equal treatment, to separate property, to *mahr* or dower from husband on marriage, to paternity of all children born in wedlock, and to divorce.

MUHAMMAD AHMED IBN SEYYID ABDUL-LAH (1848-85), Egyptian pretender; claimed to be the *Mahdi*, who was to free Egypt from foreign rule; organized revolt of Sudan against British and Turks; Sudan declared independent by Gordon, 1884, but Mahdists besieged and captured Khartum, 1885.

MUHAMRAH, MOHAMMERAH (30° 30′ N., 48° 15′ E.), town, Persia, on canal between Shat-el-Arab and Karun; exports dates, opium, wheat. Pop. 10,500.

MUHLENBERG, HEINRICH MELCHOIR (1711-87), a German theologian who arrived in Philadelphia in 1742 and there founded the first synod of the Lutheran church in 1748. See LUTHERANS.

MUHLENBERG, JOHN PETER GABRIEL (1746-1807), Amer. preacher, general, and politician; *b.* at Trappe, Pennsylvania; in War of Independence served with distinction at *Charleston, Brandywine,* and *Yorktown.*

MUHLENBERG COLLEGE, a seat of learning for men at Allentown, Pa., controlled since 1867 by the Evangelical Lutheran Church. It has a collegiate department with classical and scientific courses and a preparatory school. In 1922 there were 272 students and a teaching staff of 21 under the presidency of the Rev. J. A.W. Haas.

MUHLENBERG, WILLIAM AUGUSTUS (1796-1877), Amer. Episcopal clergyman and philanthropist; *b.* Philadelphia; founded many church schools and charity institutions, (*e.g.*) St. Luke's Hospital, N.Y., and the Church Industrial Community of St. Johnland.

MÜHLHAUSEN (51° 12′ N., 10° 30′ E.), town, on the Unstrut, Prussian Saxony; imperial free city and of great commercial importance in XIV. cent.; woolens, cotton, hosiery, beer, cycles, chemicals. Pop. 36,000.

MÜHLBACH, LUISE (1814-73), a German novelist, whose real name was Klara Müller Mundt. She was born in Neu Brandenburg. She wrote many popular historical novels, dealing with the courts of the German kings. These include *Emperor Joseph II. and His Court, Emperor Alexander and His Court, Frederick the Great and His Court.*

MUIR, CHARLES HENRY (1860), brigadier-general; *b.* Erie, Michigan. On graduating from the U.S. Military Academy in 1885 he entered the infantry as a second lieutenant, and passed through the regular grades of promotion to brigadier-general in 1919. He saw service in the Indian wars, Spanish-American war, Cuban occupation, Philippine insurrection, China Relief Expedition, and in the World War, when he commanded the 28th Division, American Expeditionary Force. He received the Victory badge of five stars, the French Croix de Guerre, and the Distinguished Service Medal. Great Britain made him a Knight Commander of the Order of St. Michael and St. George and France a Grand Commander of the Legion of Honor.

MUIR, JOHN (1838-1914), American naturalist. *b.* in Dunbar, Scotland; *d.* at Los Angeles, California. He came to the United States with his father in 1849, settling near Fox River in Wisconsin. After studying at the University of Wisconsin, 1860-64, he wandered through Canada, the United States west, east and south and acquired a wide knowledge of nature and geology. From 1868 to 1870 his head camp was in the Yosemite Valley where he made a study of glaciers and the forests of the Sierra Nevada. In 1879 he made his first trip to Alaska, discovering Glacier Bay and Muir Glacier, and explored the upper reaches of the Yukon and Mackenzie River. In 1880 he was with the De Long Arctic Expedition. A journey made in 1903-4 took him through the Caucasus, Siberia, Manchuria, Japan, India and Australia. The Yosemite and Sequoia parks are largely due to his efforts. Author *Mountains of California,* 1894; *Our National Parks,* 1901; *Stickeen,* 1909; *My First Summer in the Sierra,* 1911; *The Yosemite,* 1912; *Story of My Boyhood and Youth,* 1913; *Posthumous Works*; *Letters of a Friend,* and *Unpublished Prose and Letters,* 1915.

MUIR GLACIER, a large ice-sheet of Alaska, N. America, with 350 sq. m. of surface area, discharging into Glacier Bay. The trunk is formed of about nine main streams of ice. Earthquake disturbances dislodged part of it, 1899. Its most rapid summer movement is about 7 ft. per day, and some 200,000,000 cubic ft. of ice are daily thrown off into the bay. Since 1794 it has receded about 25 m.

MUKDEN, MOUKDEN (41° 54′ N., 123° 58′ E.), capital Manchuria, on Hun-ho; scene of Jap. victory over Russians, 1905; commercial center; furs. Pop. 165,000.

MUKDISHU, MAGADOXA (2° N., 45° 25′ E.), seaport town, Ital. Somaliland, E. Africa, on Ind. Ocean. Pop. 10,500.

MULA (38° N., 1° 30′ W.), town,

Murcia, Spain; sulphur baths. Pop. 13,500.

MULATTO. See NEGRO.

MULBERRY (*Morus alba* and *M. nigra*), shrubs introduced from Asia and extensively cultivated in Southern Europe. The black m. is grown mostly for its fruit, the white m. for its leaves, which are used as food for silkworms (*q.v.*).

MULE, the name given to any hybrid, but commonly the offspring of the male ass and the mare. The produce of a stallion with a female ass is called a 'hinny,' and is smaller and weaker than the M., and therefore less valuable. Ms. have the general shape of the horse, and sometimes measure as much as 16 hands high, but from the ass they get its obstinate disposition, the head features and the less sensitive, weather-proof coat. As a rule, they are extremely hardy and practically free from disease. They are as sure-footed as a goat, and almost invariably possess great intelligence. They are bred in large numbers for use in countries where roads are bad, and extremes of weather have to be survived. They are useful as pack animals.

MULHOUSE, or **MÜLHAUSEN,** town, Alsace, France (47° 45′ N., 7° 12′ E.); belonged to France, 1797-1871, when transferred to Germany; was restored to France, 1919; industrial center; manufactures woolens, cottons, chemicals, machinery, railway materials. During the World War it was captured and lost by the French, Aug. 1914. Pop. 95,000.

MÜLHEIM-AM-RHEIN (50° 57′ N., 7° E.), town, Rhine province, Prussia; velvet, silk, chemicals. Pop. 60,000.

MÜLHEIM-AN-DER-RUHR (51° 22′ N., 6° 10′ E.), town, Rhine province, Prussia; ironworks. Pop. 115,000.

MULLEIN, a common name for a plant which grows in fields, roadsides, etc. The plant is tall and the flowers are yellow and disposed in a long cylindrical spike.

MÜLLER, FRIEDRICH MAX. See MAX MULLER.

MÜLLER, FRITZ (1822-97), Ger. botanist and explorer; spent greater part of his life studying habits and interrelations of animals and plants in Brazil; made many contributions to Darwinism.

MÜLLER, JOHANNES (1801-58), distinguished Ger. physiologist, whose work added to our knowledge of the mechanism of the sense-organs and the physical and chemical properties of the body fluids; prof. of Physiology at Berlin, he exercised great influence on modern physiologists.

MÜLLER, JOHANNES VON (1752-1809), Swiss historian; pub. *Geschichte der Schweizer,* 1780-1808, long since superseded, but stimulus to study of Swiss history; met with a good deal of religious persecution, but received patronage of Austria and Napoleon.

MÜLLER, KARL OTFRIED (1797-1840), Ger. archæologist; devoted himself mainly to Gk. antiquities, and wrote many important works in connection therewith.

MÜLLER, WILHELM (1794-1827), a German lyric poet, *b.* at Dessau. In 1817 he went to Italy, and his first published work was *Rom, Romer und Romerinnen,* 1820, which gave his impressions of his visits. The same year he was made librarian of the ducal library. His best work is contained in the volumes entitled *Gedichte aus den hinterlassenen Papieren eines reisenden Waldhornisten* (2 vols., 1821-24) and *Lieder der Griechen,* 1821-24, the latter sympathizing with the Greeks in their struggle with the Turks. Many of his poems were set to music by Schubert, and have become extremely popular. See edition of his *Gedichte,* ed. by his son, F. Max-Müller, 1868.

MULLETS.—This name has been applied to two very distinct types of fishes: (*a*) Red Mullets, Goat-Fishes, or Sarmullets (*Mullidoe*), brightly colored red or golden bony fishes distinguished by the presence of two long barbels at the chin; carnivorous fishes, esteemed as food; found on shores of tropical and temperate seas.

(*b*) Grey Mullets (*Mugilidoe*), long, large-scaled, bony fishes which feed on the organic matter in mud, and have a muscular gizzard-like stomach; excellent food fishes; some inhabit fresh water, but most temperate and tropical seas.

MULLIGAN LETTERS, a series of letters written by James G. Blaine to Warren Fisher of Boston. These fell into the hands of Fisher's bookkeeper, Mulligan, and played an important part in the political campaigns of 1876 and 1884. It is claimed by opponents of Blaine that they contain confirmation of charges of corruption in relation with certain railroads. The charges were denied by Blaine's supporters.

MULOCK, DINAH MARIA. See CRAIK.

MULTAN, MOOLTAN.—(1) (*c.* 30°

56′ N., 72° 50′ E.); district, Punjab, India; area, 6080 sq. miles. Pop. 715,000. (2) (30° 13′ N., 71° 26′ E.), town, Punjab; besieged and captured by British, 1848-49, during second Sikh War; manufactures carpets, textiles, pottery, enamel work. Pop. 100,000.

MULTIGRAPH. See MIMEOGRAPH.

MULTIPLE PROPORTIONS, LAW OF. See CHEMISTRY.

MUMMY, an embalmed dead body. Embalming was practiced by Persians, Assyrians, Hebrews, Romans, and Mexicans, but the Egyptians were most expert, and m's are found in their tombs in great numbers. These include human beings, bulls, apes, ibises, crocodiles, and fish. Corpses of poor people were dried with salt or natron, and wrapped in coarse cloth and placed in the catacombs. Those of the rich underwent a series of complicated preparations, after which the body was enclosed in a wooden or stone shell, often ornamented with a series of pictures and hieroglyphics.

MUMPS, acute infectious disease characterized by inflammation of the salivary glands, especially the parotid, with pain and swelling, and a rise of temperature, and with a tendency, in convalescence, to pain and swelling in the testes in the male, and in the breasts and ovaries in the female. Children above the age of four and young adults are most commonly attacked; the disease is infectious before the glands begin to swell.

MÜNCHHAUSEN, HIERONIMUS KARL FRIEDRICH, BARON VON (1720-97), Ger. noble, who suggested to Rudolf Erich Raspe the character in *Adventures of Baron Munchhausen*; now proverbial braggart.

MUNCIE, a city of Indiana, in Delaware co., of which it is the county seat. It is on the Lake Erie and Western, the Cleveland, Cincinnati, Chicago and St. Louis, the Chesapeake and Ohio of Indiana, and other railroads, and on the White river. The industries include a pulp mill, glass works, iron and steel works, etc. It is the seat of the Muncie Normal Institute and has high school, a hospital and a public library. Pop. 1920, 36,524.

MUNDA, speech of India; name given by Max Müller to Turanian dialects spoken in jungles of Central Provinces and Madras and by inhabitants of neighboring hills; considered speech of extinct people. Modern Mundās are Dravidian race who adopted M. speech and were afterwards driven into wilds by Aryan invaders; it comprises these dialects: Asurī, Bhumij, Birhar, Gadabā Hō, Juāng, Kharia, Kōdā, Korkū, Korwā, Mundari, Santālī, Savara.

MUNDAY, ANTHONY, MONDAY (*c.* 1553-1633), Eng. dramatist and writer; *b.* in London; visited Rome, 1578, and on his return pub. anti-popery pamphlets. His plays are *Death of Robert, Earl of Huntingdon*, *Downfall of Robert, Earl of Huntingdon*, *Two Italian Gentlemen*, and *Sir John Oldcastle* (in collaboration).

MUNDELEIN, GEORGE WILLIAM (1872), bishop; *b.* in New York; graduated from Manhattan College in 1889. Studied theology in Pennsylvania and Rome. Ordained a priest in 1895 of the Roman Catholic Church. At Williamsburg, Pennsylvania, pastor of the Lithuanian Church and associate secretary to bishop from 1895-97. In 1897-1909 chancellor of diocese. In 1903 appointed the censor of Liturg. Academy. In 1906 appointed a domestic prelate. From 1909-16 titular bishop of Loryma and Auxiliary bishop of Brooklyn, New York. Since 1916 has been archbishop of Chicago.

MUNDELLA, ANTHONY JOHN (1825-97), Eng. Liberal politician; introduced Bill to make school attendance compulsory in England and Wales, 1881; Pres. of Board of Trade, 1866, and 1892-95; reformer of conditions of labor.

MÜNDEN (51° 25′ N., 9° 39′ E.), town, Hanover, Prussia, at confluence of Fulda and Werra; chemicals; trade in timber. Pop. 12,000.

MUNDEN, town, Hanover, Germany (51° 25′ N., 9° 40′ E.), at confluence of Fulda and Werra; chemicals, sugar; trade in timber; lignite mined in neighborhood. Pop. 11,500.

MUNGO, SAINT, the patron saint of the city of Glasgow, Scotland, and early apostle of the Christian faith in Britain. He is said to have been born in Culross in 514. He was named Kentigarn. This was changed for Mongo, the beloved.

MUNGOOSE, MONGOOSE or **ICHNEUMON,** a carnivore; see article MONGOOSE.

MUNHALL, a borough of Pennsylvania, in Allegheny co. It is on the Pennsylvania Railroad. Its industries are identified chiefly with the manufacture of steel products. It has a Carnegie Library. Pop. 1920, 6,418.

MUNICH (Ger. *Munchen*), cap. of Bavaria, Germany (48° 9′ N., 11° 33′ E.), on Isar, near Alps; one of finest and most interesting cities in Europe, with handsome streets and striking architecture; greatly beautified by Ludwig I. Among notable features are Royal Palace, National Theatre, Old Rathaus, Ruhmeshalle (with busts of celebrities), colossal statue of Bavaria, Maximilianeum (Civil Service Coll.), Isartor and Karlstor (gateways), museums, rich libraries, distinguished univ.; many fine churches: St. Peter's (12th cent.), Theatiner (with royal burial vault), St. Boniface, St. Michael's Cathedral, 1468; Frauenkirche, etc.; famous art center; celebrated school of painting; Old and New Pinakothek, Schack, and other picture galleries and Glyptothek (sculptures); home of numerous literary, scientific, etc., societies. There are noted breweries; scientific instruments, lithographs, stained glass, leather, paper, rubber goods, furniture, machinery, artificial flowers, etc., are manufactured. History dates from 12th cent.; great fire 1372; taken by Austrians, 1742. On Nov. 9, 1918, serious outbreak occurred, resulting in Bavaria being declared a republic. Attempts of royalists and so-called Fascisti to gain control of the government resulted in riots in 1923. Pop. 596,500.

MUNICIPAL GOVERNMENT, the body which administers the affairs of an incorporated city. The institution is as ancient as Roman history, many cities under the Empire, while subject to the Emperor, being allowed a certain measure of local autonomy, the local administrators being elected by the citizens. From this origin municipal government survived throughout Italy, but developed still further in England. In the United States, and especially in the New England states, municipal government has enjoyed unusual development, largely on account of the New England town meeting plan of government of the local communities, instituted by the early Puritans. The usual plan of government consists of a mayor and a council or board of aldermen, the former elected at large by the general suffrage, the latter being elected from districts known as wards. The mayor appoints his commissioners, corresponding to the cabinet of a national prime minister, or ruler, and these perform the functions of administration. The board of aldermen, or council, form the legislative branch, their powers being restricted by the city charter, which has been granted by the state legislature. The charters of cities, corresponding to the constitutions of national governments, vary in character, some being much more liberal than others, in the measure of local autonomy allowed. The system of municipal government usual in the United States, has, unfortunately, allowed much scope for political corruption, lending itself, as it has done, to the formation of party machines, though it is undoubtedly true that the system has had less to do with the development of the evil than the character of the electorate, the mass of immigrants from backward countries naturalized into citizens, being pliable material in the hands of crafty politicians. As a cure for the evil a movement, which first developed some ten or fifteen years ago, known as the 'commission form of government,' or the 'city manager plan,' has been making much headway. By this new system the mayor and his council are abolished and a committee, or commission, usually with a small membership, is elected directly by the people at large, this commission exercising the legislative and administrative powers together. The new plan is strongly backed by a national organization known as the National Municipal League, with headquarters in New York. In 1922 nearly 200 American cities had adopted it, among these being six cities each with a population of over 100,000. The six bigger cities included are Cleveland, Ohio, with a population of 797,000; Akron, Ohio, population 208,000; Dayton, Ohio, population 153,000; Grand Rapids, Mich., population 138,000; Nashville, Tenn., population 118,000; and Norfolk, Va., population 116,000. The number of cities included is all the more notable because of the fact that legislative action through the state must be invoked before the commission forms of government can be granted by charter to the individual cities. Many states have authorized the adoption of the city manager or similar plans of city government, three states taking such action in 1921: Indiana, Wyoming and Missouri. The first two have extended the privilege to all cities within their boundaries, while Missouri applies it only to third class cities.

MUNICIPAL OWNERSHIP, the ownership and usually the administration of public services or industrial enterprises by a city government. In this country the term is usually restricted to public utilities, such as the water supply, lighting, transportation, etc., but in Europe, and especially in Germany, it may and does include such diverse enterprises as the distribution of milk, slaughter houses, coal depots,

bakeries, hotels and even breweries. In Germany over forty different kinds of enterprise come under this head. One of the most notable examples of municipal ownership abroad is to be found in the city of Glasgow, Scotland, which, in 1894, began to operate a street car line, and now owns and operates all its utilities. Two-thirds of the street railways in England are municipally owned. A notable example in this country is that of San Francisco, which, in 1913, took over its street railway system and began to operate it, showing a net profit after the first year of $45,000. In 1921 that city reported itself operating 67 miles of street railways. Boston and New York both own their subway systems, but in both cases they are leased to private corporations, who operate them for their own profit. Another form of municipal ownership which has developed in this country within the past few years is garbage reduction. With the purchase of a privately owned garbage reduction plant, in 1921, New Bedford, Mass., became the eleventh city in the United States which owns and operates such enterprises. The advantages and disadvantages of municipal operation have been much discussed, but the lack of uniform statistics make it extremely difficult to decide whether municipal enterprise in this country has, on the whole, proven a success. The chief argument against the proposition is that by bringing a public service into the political field it suffers from the inevitable political corruption. The argument against this is that corruption is only possible where there are privileges to sell to outsiders, as in the form of franchises to street railway companies. In European countries a natural check to the indefinite spread of the field of municipal enterprise has appeared in cooperative enterprise, in which the consumers, entirely outside the municipal organization, associate for the purpose of supplying themselves with the necessities of life. At the present time there is a lively debate in England over the contrasting merits or disadvantages of both systems in the matter of milk supply. It is being widely conceded, however, that the cooperative method is not only the better, but the most logical. In Germany, too, the cooperatives are encroaching on the activities of the municipalities. In many instances this difficulty has been solved by the municipalities handing over the bakeries or slaughter houses or milk supply systems to the cooperatives and receiving their equivalent value in shares, the cooperatives being responsible for the administration.

MUNICIPIUM, town of which citizens, while self-governing, had privileges and duties of Rom. citizens. Rome was obliged, as she extended her rule, to allow increasing amount of autonomy; instead of annexing Tusculum, 381, or incorporating it in Lat. confederation, it was made first of new order of *municipia*, its inhabitants receiving civil, but not political rights of Romans, and having no Rom. prefect placed over them; by *lex Julia*, 90 B.C., the municipals received full rights of Rom. citizens; system spread throughout empire; relation of m. to Rome was fixed by charter. M. was composed of citizens (similar to burgesses of borough) and mere inhabitants (*incolae*); constitutions copied Rome; relationship to mediæval communes much disputed.

MUNI RIVER SETTLEMENT, RIO MUNI, SPAN. GUINEA (*c.* 1° 40′ N., 10° E.), Span. colonial possession, W. Africa; area, *c.* 10,000 sq miles.

MUNISING, a city of Michigan. Pop. 1920, 5637.

MUNKACS (48° 26′ N., 22° 42′ E.), town, on Latorcza, Hungary; noted in Hungarian history. Pop. 16,000.

MUNKACSY, MICHAEL VON (1844-1900), Hungarian painter; settled in Paris and produced chiefly genre pictures; insane from 1898.

MUNRO, NEIL (1864), Scot. novelist and journalist; made his mark with *The Lost Pibroch*, 1896, which finely interpreted the poetry of Highland character, and with a brilliant novel, *John Splendid*, 1898. His other works, mostly historical romances dealing with the Highlands, include *Gilian the Dreamer*, *Doom Castle*, *Children of the Tempest*, *Daft Days*, *The New Road*, and *Jaunty Jock*.

MUNRO, ROBERT, MONRO, MONROE (d. *c.* 1680), Scot. general; became parliamentary general in Ireland, 1644; defeated by Owen Roe O'Neill at Blackwater, 1646; refused to be superseded by Monk, 1647; captured, 1648.

MUNROE, CHARLES EDWARD (1849), Chemist. In 1871 graduated from Harvard College. For three years assistant in chemistry at Harvard. From 1874-86 professor of chemistry at the United States Naval Academy; at the War College and the United States Naval Torpedo Station from 1886-96 as chemist to torpedo corps. In 1892-1918 he was head professor of chemistry and from 1892-98 dean Corcoran Scientific School. At George Washington University, 1893-1918 dean faculty of graduate studies. Inventor of smokeless powder. Consulting expert of United States Bureau of Mines, United States

Geological Survey, and Civil Service Commission. Author of many books on explosives and chemistry.

MUNROE, HENRY SMITH (1850), mining engineer. *b.* in Brooklyn, New York. Graduated from Columbia University in 1869. From 1870-71 assistant geologist of Ohio State Geological Survey and assistant chemist, 1870-72 of United States Department of Agriculture. In 1872-75 at Yezo, Japan, assistant geologist and mining engineer. At University of Tokio from 1875-76 as professor of geology and mining. Adjunct professor of surveying and practical mining, 1877-91, professor of mining, 1891-1915, emeritus professor 1915, dean faculty of applied sciences, 1897-99, member of University council, 1895-1915 of Columbia University. In 1917 consulting engineer of United States Bureau of Mines.

MUNSEY, FRANK ANDREW (1854), publisher; *b.* Mercer, Maine. He embarked as an editor and publisher in New York City in 1882, when he established the Golden Argosy, a magazine for juveniles, afterwards developed for adults as the Argosy. In 1890 he founded Munsey's Magazine. He was among the pioneers of the cheap magazine, of which he established several, and later acquired a number of newspapers, among them the Washington Times, Baltimore News and the New York Press, Sun, Herald and Telegram.

MUNSTER (*c.* 52° 18′ N., 8° 30′ W.), province, S.W. Ireland, containing counties Tipperary, Clare, Limerick, Kerry, Cork, and Waterford. Pop. 1,033,085.

MÜNSTER.—(1) (51° 57′ N., 7° 37′ E.), town, Prussia; capital of Westphalia; with cathedral (XII. cent.) other fine churches; castle, univ., etc.; Peace of Westphalia signed here, 1648; manufactures cotton, linen, machinery, leather. Pop. 92,000. (2) (48° 3′ N., 7° 10′ E.), town, Alsace, Germany; textiles. Pop. 6,000.

MÜNZER, THOMAS (1489-1525), Ger. religious teacher; held extreme views, religious and political, advocating communism; caught and executed by Philip of Hesse.

MURAD. See AMURATH.

MURAL DECORATION.—The oldest form of m.d. known is to be found in the caves of prehistoric man, and consists of rude outlines of men, beasts, and episodes of the chase drawn or scratched on the rock. This is curious, because in the early historic ages m.d. took an entirely different form, that of sculptured basreliefs. The tombs and other monuments of Egypt, Nineveh, and Babylon abound in these, and show that the practice was a popular one for a period of 4000 or 5000 years. The wall slabs were usually of marble or sandstone, the outlines touched with red, and the whole relief painted. This king of d., found also among certain peoples of South and Central America, has now almost completely lapsed, though the figureless d's of even modern Muslim buildings exhibit traces of similar methods. The usual d. of Muslim mosques is on somewhat different lines, being stone panels of elaborate tracery, usually of geometrical patterns. In Western European work of the XV. cent. similar decorative methods were frequently used.

Glazed bricks or tiles, and slabs of thin colored marbles, form another important group, favored particularly by Muslims and architects under their influence—Byzantine and Spanish; the method is of Assyrian origin and was adopted by the Romans. Closely akin to this is the mosaic d., which reached its highest degree of perfection in the later Rom. Empire, and is still the favorite method in Eastern churches.

Hangings of stamped leather, tapestry, embossed paper, or *papier mache* began to come into use in the XVI. cent., the idea being probably imported by merchants from the Far East, as the Chinese are known to have used wallpapers long before that. The first papers used were imitations either of leather, stucco, or tapestry. In France the tapestry hangings, fostered by such artists as the Gobelins, made great strides, but modern ideas of hygiene appear to militate against their frequent use. Modern wallpapers owe much to the efforts of William Morris and his followers in the second half of last cent.

Wood-carving and oak panels more or less elaborately carved were in great vogue in the Stewart period, in England and throughout Europe. Some of these panels from Malines are among the finest m.d's known, and fine specimens abound in old Eng. country houses.

The most decorative method, however, is undoubtedly that which uses color. Fresco- and panel-painting were popular from the earliest times, though in our own day they are generally restricted to public and ecclesiastical buildings. The advent of Christianity appears to have given a notable impetus to decorative painting of this kind, which indeed formed the great bulk of mediæval pictorial art. The Renaissance led to the finest fresco and decorative painting known. The names of almost every great artist of the Renaissance is associated with this kind of work. After them it largely fell into disuse, though

in most European countries an attempt has been noticeable of late to revive the art of fresco-painting.

MURANO (45° 27′ N., 12° 20′ E.), town, on island of Venetian lagoon; long noted for manufacture of Venetian glass; has fine cathedral. Pop. 5,600.

MURAT, JOACHIM (1767-1815), king of Naples; *b.* La Bastide; *s.* of innkeeper; rose in army, and became one of constitutional guard of Louis XVI., 1791; lost command, 1795, on fall of Jacobins; aided Napoleon to subdue revolts against Convention, became his first *aide-de-camp*, and won fame as commander in Italy and Egypt; general of division, 1799; commander of consular guard, 1799; *m.* Caroline, Napoleon's sister, 1800; led cavalry at battle of *Marengo*, 1800, and compelled Naples to agree to *Treaty of Florence*, 1801; gov. of Paris, marshal of empire, prince, and grand admiral, 1805. M. commanded cavalry at *Austerlitz*, 1805 (receiving as reward grand-duchy of Berg and Cleves), at *Jena*, *Eylau*, and *Friedland*; suppressed Span. insurrection, 1808; became king of Naples by Napoleon's grant, 1808; tried to make Naples strong modern independent state, and incurred Napoleon's anger; led cavalry in invasion of Russia, 1812, and subsequent invasion of Germany, and then deserted Napoleon. Austria guaranteed his possession of Naples, 1814, in return for alliance against Napoleon, but allowed his claims to be neglected at Treaty of Vienna. M. thereupon re-established relations with Napoleon, and there seemed prospect of Ital. rising in his favor, but he was defeated by Austrians, who replaced Bourbon sovereign. He was executed at Pizzo after an attempt to recover his kingdom.

MURIATIC ACID. See HYDRO-CHLORIC ACID.

MURATORE, LUCIEN, French operatic vocalist; *b.* Marseilles, France, from the Conservatoire of which city he graduated at the age of nineteen. He studied further in Paris, where he later appeared at the Opera Comique with Calve and Dufresne in *La Carmilite*. He also sang in *Faust*, *Romeo* and other operas and created leading roles in *Bacchus*, *Le Miracle*, *Salome*, *Siberia*, etc. From 1912 to 1919 he played principal parts in the productions of the Chicago Grand Opera Association.

MURATORI, LUDOVICO ANTONIO (1672-1750), Ital. historian; *b.* Vignola, Modena; librarian of the Ambrosian Library, Milan, 1695; of the D'Este Library at Modena, 1700; wrote the *Rerum Italicarum Scriptores*; also a history of Italy.

MURCHISON, SIR RODERICK IMPEY (1792-1871), Brit. geologist; *b.* Tarradale, Ross-shire, Scotland; ed. Durham Grammar School, then Military Coll., Gt. Marlow; gazetted ensign, 1807; studied art and antiquities and later took up geol., specializing in continental geol. In 1831 he studied rocks underlying Old Red Sandstone in Wales and established Silurian system; later carried on researches in Scot. Highlands.

MURCIA.—(1) (37° 55′ N., 1° 30′ W.) S. E. Coast province, and former kingdom Spain; area, 4453 sq. miles; produces esparto grass, cereals, fruit; lead, zinc, coal, sulphur, copper. Pop. 600,744. (2) (37° 59′ N., 1° 10′ W.), capital of above; seat of bishopric; has cathedral; manufactures silk, gunpowder, saltpetre, glass; produces olive-oil. M. passed into Moorish possession VIII. cent; taken by Alphonso X. of Castile, 1263; assaulted by French, 1810, 1812. Pop. 125,000.

MURDER is the killing of a human being by another human being either by violence or by an omission, and with *malice aforethought*. The absence of malice reduces the crime to *manslaughter*, and if the killing is done in self-defense then it is *homicide* and may be *justifiable homicide*. Every person who kills another is presumed to have committed wilful murder, unless the circumstances are such as to raise another presumption. Capital punishment is now observed only for those convicted of wilful murder, though the capital sentence is still read out against those convicted of high treason.

The attempt to commit murder is a felony, and on conviction the offender is liable to penal servitude for life. Administering poison, or any other destructive matter; wounding, or causing serious bodily harm; shooting at any person; attempting to drown, strangle, or suffocate any person; destroying or damaging any building by means of explosive substances—are all regarded as attempts to commit murder.

MURDOCH, WILLIAM (1754-1839), a British engineer and inventor, *b.* at Auchinleck, Ayrshire. In 1792 he used coal-gas as an illuminant in his own house, and ten years later it was used for lighting Soho. He also experimented on a high-pressure locomotive, and in 1784 made a small locomotive steam-engine. He improved greatly on Watt's steam-engine, and invented apparatus by which it was possible to use compressed air, devising the first oscillating steam-engine.

MURDOCK, VICTOR (1871), Trade Commissioner; *b.* in Burlingame, Kansas. Educated in public schools and an academy in Kansas. From 1894-1903 managing editor of a Kansas daily newspaper. Elected to Congress in 1903 and reelected from 1905-15. In 1917 appointed a member of the Federal Trade Commission at Washington and reappointed for term expiring 1925. In 1919-20 chairman of Federal Trade Commission. A Member of Meat Commission, United States Government, 1918. Author of: *China, the Mysterious and Marvelous*, 1920, and *Folks*, 1921.

MURFREE, MARY NOAILLES ('Charles Egbert Craddock') (1850-1922), author; *b.* Murfreesboro, Tenn. Her first work appeared in the Atlantic Monthly in 1878. *In the Tennessee Mountains*, published in 1884 began a succession of novels under her masculine pen name reflecting the rugged life of that region, which she made her own for fictional purposes. Her last work, *The Story of Duciehurst*, appeared in 1914.

MURFREESBORO, a city of Tennessee, in Rutherford co., of which it is the county seat. It is on the Nashville, Chattanooga and St. Louis railroads, and is the center of an extensive cotton and agricultural region. The industries include carriage shops, planing mills, saw mills, machine shops, cotton gin works, flour mills, etc. It is the seat of the Middle Tennessee State Normal School, and Soule College. Nearby was fought, on December 21, 1862, the bloody battle of Stone river, in which the Confederate army was obliged to retreat. Pop. 1920, 5,367.

MURGHAB (36° 30′ N., 62° 28′ E.), river, rises in Afghanistan, and after a N.W. course of over 400 miles is lost in the desert of Merv.

MURI (10° 17′ N., 11° 40′ W.), province, N. Nigeria; area, *c.* 25,850 miles; produces timber, cotton; silver occurs in galena reefs. Pop. *c.* 828,000.

MURILLO, BARTHOLOMÉ ESTEBAN (1617-82), Span. painter; studied first with Juan del Castillo; went in 1641 to Madrid, and there received encouragement and practical help from Velazquez. Returning in 1645 to his native Seville, he soon became famous. He founded the Academy of Seville in 1660. His pictures fall into two distinct classes—scenes from low life, and Biblical and religious subjects.

MURMAN COAST, Arctic coast of N. Russia (69° N., 35° 30′ E.), between Norway and the White Sea: W. part deeply indented, E. portion more regular; shores generally lofty and rocky. Alexandrovsk, an ice-free port, and connected with Petrograd by a railway built during the World War, promises to become important. Brit. expedition sent to Murman coast, July 1918, to prevent Germans then in Finland from using it as submarine base, and to secure railway. Evacuation entirely completed by end of Sept. 1919. Region ceded by Russia to Finland.

MUROM (55° 38′ N., 42° 6′ E.), town, on Oka, Vladimir, Russia: flour-mills, distilleries. Pop. 13,700.

MURPHY, CHARLES FRANCIS (1858), leader of Tammany Hall; *b.* New York City. He had a public school education, worked as a street car driver in his native city, and later began his political career in conjunction with his management of a number of saloons, several of which he established in lower New York. In 1891 he became a Tammany leader of his Assembly district and achieved note locally as a political organizer. The only public office he occupied was that of a commissioner of docks and ferries from 1897 to 1901. The following year he succeeded Richard Croker as chief of the Tammany organization. Under his leadership Tammany suffered periodic reverses, due to the swing of public sentiment and to recurrent and fleeting triumphs of fusion or reform tickets, but the strength of his organization among the city's masses was never fundamentally affected. His most signal triumphs were Tammany's recapture of the city's administration in 1917, when its candidate, John F. Hylan (*q.v.*) defeated the fusionist mayor, John Purroy Mitchel (*q.v.*) who sought re-election, and the re-election of the Hyland administration in 1921 by an overwhelming majority over a fusion (Democratic-Republican) ticket.

MURPHY, JOHN FRANCIS (1853), landscape painter; *b.* Oswego, N.Y. He acquired his art chiefly by self-tuition. In 1876 his work began to be exhibited in the National Academy of Design, of which he later became a member. Various landscapes of a high order of art earned for him a Halgarten Academy prize in 1885, the Webb prize (Society of American Artists) in 1887, a gold medal at Charleston in 1902, a silver medal at the St. Louis Exposition of 1904, and the Inness medal in 1910. His *Autumn* is in the collection of the Metropolitan Museum of Art, New York City.

MURPHY, LAMBERT (1885), tenor; *b.* at Springfield, Massachusetts. Took academic course at Harvard College and studied singing in Boston from 1904-8.

In various churches in Brookline, Fairhaven and Boston and in 1910 soloist in St. Bartholomew's Church, New York. Had further study and in 1911 he was engaged by the Metropolitan Opera Company. Appeared at many festivals and was a concert singer of note.

MURPHYSBORO, a city of Illinois, in Jackson co., of which it is the county seat. It is on the Illinois Central, the Mobile and Ohio, and the St. Louis Iron Mountain, and Southern railroads, and on the Big Muddy river. Its industries include railroad shops, flour mills, lumber mills, shoe factories, brick works, etc. There is a high school and a hospital. Pop. 1920, 10,703.

MURRAIN, general term for various infective diseases of cattle; hence used as a curse.

MURRAY (34° 10′ S.; 140° E.), largest river, Australia; rises in the Australian Alps; flows into Encounter Bay by Lake Alexandrina; length, 1300 miles.

MURRAY, SIR ARCHIBALD JAMES (1860), Brit. soldier; entered army, 1879. During the World War he acted as deputy chief and afterwards as chief of Imperial General Staff, 1914-15, and was mentioned in dispatches; was appointed to Mediterranean command, Dec. 1915, and held the command in Egypt, 1916-17, being succeeded by General Allenby. From 1917 to 1919 he was in command at Aldershot.

MURRAY, ARTHUR (1851), major-general; *b.* Bowling Green, Mo. He entered the artillery on graduating from the U.S. Military Academy in 1874. From 1881 to 1886 he taught philosophy at West Point, and from 1896 to 1898 served as professor of military science and tactics at Yale. He was acting judge-advocate of the Dakotas between 1887 and 1891, filled army assignments in Cuba and the Philippines, became captain of artillery in 1898, brigadier-general in 1906, major-general in 1911, and retired in 1915. As a writer on military subjects, he published a manual on courts martial, a manual of arms and a text book on mathematics for machine gunners.

MURRAY, LINDLEY (1745-1826), grammarian; *b.* Swatara, Pa., *d.* Holgate, Yorkshire, England. His father was a New York merchant and a Quaker. After an education at a Friends' School he studied law and was admitted to the New York bar in 1766. He accumulated a substantial fortune during and after the Revolution in commercial pursuits, and in 1784 removed to England for reasons of health. He became famous by his *English Grammar*, 1795, the first text book of its kind that attempted to formulate out of chaotic teachings an orderly system of writing and speaking the language. The work was originally prepared for use in a York ladies' school where he gave instruction. It was followed by *English Exercises* and a *Key* and *English Reader*, and a *Spelling Book*. His works for long were standard textbooks in English and American schools, and though they were finally superseded his name remained as an influential tradition in the educational world even beyond the Victorian era.

MURRAY, LORD GEORGE (1694-1760), Scot. Jacobite; fought for Pretender, 1715 and 1719; pardoned 1725; joined Charles Edward, 1745, and showed skilful leadership at *Prestonpans* and siege of Carlisle.

MURRAY, or **MORAY, JAMES STEWART, EARL OF** (*c.* 1531-70), Regent of Scotland; illegitimate *s.* of James V.; joined Lords of Congregation, 1559; cr. earl, 1562; opposed Darnley marriage; became regent on Mary's abdication, 1567; defeated her army at *Langside*, 1568, and produced *Casket Letters*; murdered.

MURRAY, JOHN, the name of four generations of London publishers, who from the founder (1745-93) onwards, have been associated with some of the greatest names in contemporaneous Eng. lit.

MURSHIDABAD, MOORSHEEDABAD (24° 11′ N., 88° 19′ E.), chief town, district of M., Bengal, India; ivory-carving and silk-weaving industries; capital of Bengal in XVIII. cent. Pop. (with Azimganj) 30,000; (dist.) 1,345,000.

MUSÆUS, a Greek grammarian who flourished about the 5th century A.D. He wrote an erotic poem, describing the loves of Hero and Leander, which has been translated into English more than once, notably by Christopher Marlowe (Dilthey's ed., Bonn, 1874).

MUSÆUS, JOHANN KARL AUGUST (1735-87), a German author, *b.* at Jena. His first work, entitled *Grandison der Zweite*, was published in 1762; rewritten about twenty years later under the title of *Der deutsche Grandison*, its object being to satirize the English novelist Richardson's hero. His most important work was: *Volksmarchen der Deutschen*, a series of satirical tales published 1782-86.

MUSCAT, MASKAT, MUSKAT (23°

29′ N., 58° 33′ E.), town, Oman, Arabia; important seaport; center of trade between India, Persia, Arabia, and African coast; surrounded by wall. Pop. 20,000.

MUSCATINE, a city of Iowa, in Muscatine co., of which it is the county seat. It is on the Chicago, Rock Island and Pacific, the Chicago, Milwaukee and St. Paul and other railroads, and on the Mississippi River. Its industries, which are important, include pork packing, flour mills, fruit and vegetable canneries, rolling mills, foundries, sawmills, etc. The manufacture of buttons is also an important industry. It is the seat of the county hospital, county insane asylum and has a public library and other public buildings. Pop. 1920, 16,068.

MUSCHELKALK, the middle member of Triassic system in Germany; no examples in Britain; consists of grey limestones 500-1000 ft. thick.

MUSCLE, tissue composed of elongated cells, or m. fibres, and consisting of three kinds: striated or voluntary m., non-striated or involuntary m. and heart m. The fibres in *striated* or *voluntary m.* are arranged in bundles enclosed in delicate membranous sheaths, and each fibre has alternately layers of dark and light material, giving it a transversely striated appearance. M. of this type constitutes the fleshy part of the body its principal functions being movement and the exertion of force, both of which are under the control of the mind. The fibres of *non-striated* or *involuntary m.* have fine longitudinal but no transverse markings, and they are extremely long and narrow; non-striated m. constitutes a great part of the walls of the alimentary canal, blood-vessels, uterus, bladder, and is also found in the skin; m. of this type is not under the control of the mind. *Heart m.* also is independent of the control of the mind, and is composed of somewhat rectangular cells, branching at the ends, with transverse markings hardly so distinct as those of voluntary m. fibres. A voluntary m. is usually made up of a central fleshy part with a tendinous part, of fibrous tissue, at each extremity, by which it is attached at each end to a bone, or, less commonly, to cartilage, fascia, or skin. Each m. is supplied by one or more nerves through which it is controlled by the brain, and by blood-vessels and lymphatics, while it is enveloped by a fine membrane, offshoots from which separate the smaller muscular bundles composing the body of the muscle. The number of m's in each side of the body is about 400, so that it is impossible to describe them here; they are named in various ways: from their position, (*e.g.*) *temporal*; from their direction, (*e.g.*) *external oblique*; from their attachments, (*e.g.*) *sterno-cleido-mastoid*; from their shape, (*e.g.*) *deltoid* (*i.e.*) from the Gk. letter *delta* △; or from their uses, (*e.g.*) *extensor longus digitorum.*

The most characteristic property of m. is its power of shortening when stimulated, or its contractibility. When a m. is stimulated there is a change in the elasticity in the component m. cells, and the points of attachment of each cell to its neighboring tissue elements yield to the strain put upon them, the diameter of the cell between these points diminishing while the other diameter is increased, the volume of the cell thus remaining the same. There is also a chemical change in the m., marked chiefly by the production of sarcolactic acid, while carbon dioxide is also produced. The exhaustion which follows prolonged activity on the part of a m. is due to the accumulation of these waste products, which are eventually removed by the lymph. The stimulus which causes muscular contraction may be mechanical, chemical, or electrical, but normally contraction is due to the influence of the nerves which are distributed to the m's and which are controlled by the brain.

MUSCLE SHOALS. See POWER, WATER.

MUSCOVITE, a rock-forming mineral belonging to the same group as mica; widely distributed; occurring in igneous rocks, but never in volcanic rocks. See also MICA.

MUSES (classical myth.), nymphs, children of Zeus and Mnemosyne or of Ouranos and Gaia; nine in number; patronesses of art. Their names and attributes are as follows: Calliope (epic poetry), Erato (erotic poetry), Euterpe (lyric poetry), Melpomene (tragedy), Thalia (comedy), Polyhymnia (sacred music), Terpsichore (dance and choral ode), Clio (history), and Urania (astronomy). The Romans confused them with the *Camenoe.* Their haunts in Greece were Pieria, Thespiæ, and Mt. Helicon.

MUSEUM, BRITISH. See BRITISH MUSEUM.

MUSEUMS (Gr. *mouseion*, 'temple of the Muses'), buildings consecrated to preservation and exhibition of valuable and interesting objects of art (in its widest sense) and science. Museums may be very comprehensive in their contents, embracing practically every branch of study; or they may be highly specialized, such as the Shakespeare Museum at Stratford or the Museum

of Paris. The finest example of a purely *civic* museum is the Musée Carnavalet of Paris. *National* and *provincial* museums each serve different ends. In itself a *national* museum has two very distinct objects in view. Its galleries and public exhibits are for the general education of the people; but in its storerooms are to be found valuable collections of, say, animals or plants, brought together from all parts of the world, awaiting the scrutiny and determination of the scientist. Such a museum, too, provides a safe place of refuge for unique specimens, the disappearance of which would hamper scientific progress. Typical national museums are the Brit. Museum in London, the National Museum in Washington, or the great Natural History Museums of Berlin and Vienna. Others of importance are Peabody Museum of Harvard, American Museum of Natural History, New York, Field Museum of Chicago, and Metropolitan Museum of Art, New York. On the other hand, the function of the *provincial* museum is rather to supply local wants, to illustrate in a general way the various types of, let us say, animals, but more particularly to exhibit the fauna, flora, historical and other objects of the area in which it is stationed.

MUSH (38° 47′ N., 40° 29′ E.), town, Armenia, Asiatic Turkey. Pop. 30,000.

MUSHROOM (*Agaricus* or *Psalliota campestris*), a basidiomycetous fungus, commonly found on fields which have been grazed over, and thus contain organic food material. The edible portion represents the fructification only of the plant, the vegetative parts consisting of a tangled web of whitish strands, or hyphæ, termed the mycelium. The spores are chocolate brown and are borne on gills, which radiate from the central stalk. They are protected by an umbrella-shaped upper portion. When immature, the gills are covered in a veil-like flap—the plant being termed a 'button.' The veil is ruptured at maturity by the expansion of the upper parts. The m. is usually cultivated from spawn,—that is, soil containing mycelium,—plentiful manure and a warm situation being essential.

MUSIC, as we understand it, has a comparatively short history. Music of a kind must have existed from the earliest ages, and we know that it was practiced in the days of the Egyptians, Grecian, and Roman empires. The musical scales of the Greeks have formed a theme for learned discussion among the experts, and it is generally agreed that no melody or harmony in the least resembling modern types could have been produced from these scales.

It was not until about the year A.D. 330, when Pope Sylvester instituted a singing school at Rome, that music began to assume something of a definite shape. Later in the same century, St. Ambrose, Archbishop of Milan, did much for its reform in the Church; and further advance was made by Gregory the Great, 590-604, whose system of musical scales is known as *Gregorian modes*. About this time a primitive kind of harmony began to be employed.

Guido of Arezzo (1000-50) and Franco of Cologne (*c.* 1200) between them laid the foundations of musical notation. Guido may fairly be called the inventor of Sol-fa, being the first to employ the syllables *ut* (now *doh*), *re*, *mi*, *fa*, *sol*, *la*; the syllable *si*, for the seventh of the scale was not introduced till the 17th cent. Franco's part in the advance lay mainly in the devising of differently shaped notes to express different time lengths. He also invented 'rests', and divided time into 'dual' and 'triple'.

Still, there had been, so far, no composers, strictly so-called. It was not until the rise of the Netherlands school in the 15th cent. that music as an art had its real beginning. Josquin des Prês (1440-1521) is described by some historians as 'the first composer of modern music'. He was certainly a pioneer, and greatly influenced the trend and history of the art. One or two of his pupils became leading figures in musical history, notably Adrian Willaert (1490-1563), who is credited with the invention of the madrigal. A distinguished contemporary of Willaert was Orlando Lasso (*c.* 1520-94), born at Mons, in Belgium. He was named the 'Prince of Music,' and was celebrated all over Europe, employed and honored by kings and nobles. But the real glory of that early period was Palestrina (*c.* 1524-94), who was born to effect a complete revolution in the style of Church music. Palestrina is the first composer who is treated seriously by musical historians, though he is rather a herald of the really great composers than one of the greatest in his own person.

Following him there were no masters of the first rank until the advent of Handel and Bach, both born in 1685, though it was within this period that the great forms of opera and oratorio came into being. The first opera ever written was, in fact, produced on the day of Palestrina's death. About this time England had a number of more or less talented composers, including John Bull, reputed by some the composer of

'God save the King'; John Dowland, subject of a Shakespearean sonnet; and Henry Lawes, celebrated by Milton. The one really great name in Eng. music was, however, that of Henry Purcell, who died ten years after Handel and Bach were born. With these outstanding names, musical history and composition started on a course which has gradually led on, by devious and varied evolutionary processes, to the modern school of Wagner and his successors. Haydn, Mozart, Beethoven, Schubert, Schumann, Mendelssohn, Chopin, Brahms, Tschaikowsky (see separate articles)—these are among the immortal names in the history of the art. With the 20th cent. came developments in the impressionist manner—(*cf.*) of the compositions of Richard Strauss, Debussy, Max Reger, Maurice Ravel.

MUSICAL BOX.—A small instrument which renders tunes automatically when wound up; the sounds are produced by vibrating steel teeth, cut in a comb or flat steel plate.

MUSICAL NOTATION is the expression of sounds by writing. It has long been fixed by the use of the five-line staves, with their treble and bass clef signs, sharps and flats, and varying time-length, note forms—semibreves, minims, crotchets, quavers, etc. This modern notation is the result of a combination of a letter-notation of the early Middle Ages.

MUSK (*Mimulus moschatus*), a small perennial plant of the order Scrophulariaceæ, with hairy leaves and bright yellow flowers. Some fine horticultural varieties have been introduced. These are best grown in pots trained on wire frames or in hanging baskets.

MUSK DEER. See DEER FAMILY.

MUSK OX. See SHEEP GROUP.

MUSK RAT. See under MOUSE FAMILY.

MUSKEGON, a city of Michigan, in Muskegon co., of which it is the county seat. It is on the Pere Marquette the Grand Rapids, and Indiana, the Grand Trunk and other railroads, and on Lake Michigan, at the mouth of the Muskegon river. It has one of the best harbors on the lake and has steamboat service with Chicago, Milwaukee and other lake ports. The industries include tanneries, woolen mills, piano factory, engine and boiler works, iron and steel works, etc. The raising of celery is an important industry. It is the seat of Hackley Manual Training School and has a public library and a hospital. Pop. 1920, 36,570.

MUSKEGON HEIGHTS, a city of Michigan, in Muskegon co. It is on the Grand Rapids and Indiana and other railroads. Pop. 1920, 9,514.

MUSKET, the 'smoothbore' firearm used by infantry before the introduction of the 'rifle'.

MUSKINGUM COLLEGE, in New Concord, Ohio, was established in 1837 by the United Presbyterian Church. In 1922 it had 620 students and a teaching staff of 29 under the direction of J. K. Montgomery, D. D.

MUSKINGUM RIVER, in Ohio, rises in Coshocton county, and flows for 120 miles through the eastern section of the State to the Ohio, which it joins at Marietta. Zanesville and McConnelsville are also on its banks.

MUSKMELON. See MELON.

MUSKOGEE, a city of Oklahoma, in Muskogee co., of which it is the county seat. It is on the Missouri, Kansas and Texas, the St. Louis and San Francisco, and other railroads. Its industries include the manufacture of hardware, steel products, and cotton goods. It is the center of an extensive agricultural and stock raising region and oil and natural gas are found in abundance. The city has many handsome public buildings, including a post-office, high school, library and several clubs. There is also an excellent system of public parks. It is the seat of St. Joseph College, Spalding Female Institute, and Oklahoma Women's College. Pop. 1920, 30,277.

MUSK PLANTS. The odor of musk occurs in a number of plants besides the common musk. The musk mallow (*Malva moschata*) emits the odor when rubbed, especially in hot weather. The musk stork's bill (*Erodium moschatum*) smells strongly of it if handled; but the moschatel (*Adoxa moschatellina*) diffuses it from all parts of the plant except when bruised. The musk thistle (*Cardinus nutans*) has a powerful musky scent. The musk orchis (*Herminium monorchis*) smells like musk at night. A melon (*Cucurbita moschata*), the musk rose, and the musk tree (*Eurybia argophylla*) are among many other plants, etc., which give rise to the odor.

MUSLIM. See MUHAMMADAN RELIGION.

MUSLIN, a fine cotton cloth, said to have been first made at Mosul, a city of Mesopotamia. It resembles gauze in appearance, except that it is woven plain without any twisting of the warp threads on the weft. Some

very fine specimens have been produced in India, the Arni M. of the Madras presidency, and the Dacca M., made at Dacca, in Bengal, being especially famous. The material is now made in Europe, and numerous varieties are produced. It is used for dresses, curtains, blinds, cushion-covers, etc.

MUSPRATT, JAMES (1793-1886), Irish chemist; applied scientific principles to chemical manufacture (at Dublin, Liverpool, St. Helens), especially alkalis and sulphuric acid. His *s.*, James Sheridan M. (1821-71), was a pupil of Graham and Liebig; prepared toluidine and nitroaniline with Hofmann; founder and director of Liverpool College of Chemistry.

MUSQUASH. See under MOUSE FAMILY.

MUSSEL, a name for various forms of mollusc, but most commonly applied to the numerous widely distributed Mytilidæ. The common M. (*Mytilus edulis*), which forms the familiar wedge-shaped shell, is very abundant. While young, the Ms. are capable of moving about with the aid of the small brown foot, but later they attach themselves to rocks and to one another by spinning a bundle of tough threads (*byssus*). Though they are even more liable than oysters to pollution, they are important articles of diet in many districts, but they are utilized in greater numbers as bait in deep sea fisheries. The fresh-water Ms. (*Unionidoe*) are also numerous and widely distributed.

MUSSELBURGH (55° 57′ N., 3° 3′ W.), town, Midlothian, Scotland; at mouth of Esk; Loretto School is built on site of famous shrine; race-meetings held annually. Pop. 16,000.

MUSSET, LOUIS CHARLES ALFRED DE (1810-57), Fr. poet; wrote melodious poems, small, exquisite dramatic pieces, some of them amusing comedies, and polished harmonious prose; brought to perfection the *Proverbe*; excesses hastened his death; *Confessions d'un enfant du siecle* is subtle autobiographical analysis of *mal du siecle*; character and style also to be studied in *Espoir en Dieu, Stances a la Malibran, Le Treize Juillet, La Lettre a Lamartine,* and several poems called *La Nuit,* etc.

MUSSOLINI, BENITO (1885), Ital. statesman; *b.* Predappio. While still very young, he embarked heart and soul in the Socialistic movement that was daily gathering strength in Italy and threatening revolution. He became a leader in the party, and editor of one of the most violent of proletarian papers, the Avanti. Many times he came under the ban of the government because of his truculence and recklessness. He took part in the Romagna uprising in 1914 which was defeated. He was a patriot however, more than he was a socialist, and when Italy entered the World War he broke with his party, enlisted in the army and served with distinction, being many times wounded. Following the conclusion of the struggle, the Communist elements in Italy became very strong and sought to throw the Government into the arms of Bolshevism. The insolence of the Communists passed belief, and the Government feared to take drastic measures for their repression. Under these circumstances, Mussolini in Milan, March, 1919, organized the first local band of the Fascisti (*q.v.*). The organization spread rapidly, soon included many of the most patriotic and conservative elements of the kingdom and became a power to be reckoned with both by the Socialists and the Government. To the Socialist excesses it opposed its own program of force, and many cities were the scene of bloody combat between the two elements. Gradually however, the Fascisti gained the upper hand, and and Socialists, cowed and beaten, almost ceased to exist as a party. The Mussolini turned his attention to the Government, which he declared was vacillating and inefficient and boldly announced his intention to seize the reins of power. 'I take a solemn oath,' he declared in Naples in October, 1922, 'that either the Government of the country must be given peacefully to the Fascisti, or we will take it by force.' On Oct. 30, he marched on Rome at the head of 100,000 black-shirted followers. The people greeted him with acclamations. The Government, panic-stricken, contemplated the proclamation of martial law, but finally capitulated and King Victor Emmanuel directed Mussolini to form a government. This he did, retaining in his own hands the portfolios of Foreign Affairs and the Interior, so that he might have supreme power over both the foreign and domestic policies of the kingdom. His policy as Premier was marked by force, determination and an unswerving aim to make his country one of the leading powers of Europe.

MUSTANG, wild horse of Amer. prairies. See HORSE FAMILY.

MUSTAPHA KEMAL, (1882), Turk. Nationalist leader; usurped power in many parts of Anatolia after the World War, in alliance with Young Turks, or Committee of Union and Progress; sent to Samsun and Trebizond to suppress brigands (July 1919); refused to obey, and

was outlawed; took possession of many vilayets till he had established himself at Ismid, within 40 m. of Constantinople (Oct. 1919); Gr. and Allied troops took the fie d against him, and defeated the rebel movement (1920). By his signal defeat of the Greek armies in Asia Minor in 1922 he became virtual master of Turkey. He was elected president of the National Assembly in August, 1923. See TURKEY; LAUSANNE CONFERENCE.

MUSTARD, a term which includes two species of Brassica—*B. alba*, the seedlings of which are used in salads, and *B. nigra*, the black m., the seeds of which, when ground, yield the well-known condiment. The seeds of this species also yield m. oil on distillation with water—a glucoside, allyl isothiocyanate, of pungent and irritant character.

MUSTARD GAS, dichloraethyl sulphide, $(C_2H_4)_2Cl_2S$, a most effective battle gas, first used by the Germans during an attack on Ypres in June 1917. On identification it became known to the French as 'ypérite', and to the British as 'mustard gas'. Its effect was devastating, and our gas casualties in July 1917 were almost as numerous as those incurred during the previous years of war. It was first used by the American army in Sept. 1918, in the attack on the Hindenburg line, and was employed by the French three months earlier.

The 'gas' having a very slight smell, and producing no immediate sensations of discomfort, is not easily detected. Exposure, even to a low concentration, is sufficient to put a man out of action owing to its effect on the eyes and lungs. Severe blisters are produced by splashes of the liquid. It was discovered by Guthrie in 1861. See ASPHYXIATING GASES.

MUTILATION, the practice, widespread among savage and to some extent among civilized races, of inflicting injury (or ornamentation) on the human body for religious or other purposes. It has taken many different forms; thus the Chinese bind their girls feet, some Amer. Indians flatten their children's skulls, savages knock teeth out, and tattooing is very largely practiced even among civilized peoples. Many m's are inflicted in initiatory rites at puberty; others simply from fashion or custom.

MUTINY, INDIAN. See INDIA.

MUTSUHITO (1852-1912), Emperor (Mikado) of Japan; succeeded in 1867, and proceeded to abolish feudalism and establish strong central government; tremendous changes in Japan under his rule, heralded by transference of cap. from Kioto to Yedo, henceforth called Tokio ('the eastern capital'); modern civilization introduced.

MUTTRA, MUTHARA.—(1) (27° 30′ N., 77° 50′ E.), district, United Provinces Brit. India; area, 1443 sq. miles. Pop. 770,000. (2) (27° 28′ N., 77° 41′ E.), capital of above; Hindu religious center, has many mosques and temples. Pop., 62,000.

MUZAFFAR - ED - DIN (1853-1907) shah of Persia; succ , 1896; established great friendship with Russia and raised large loans there; revolution, 1906, on account of misgovernment; monarchy made constitutional.

MUZAFFARGARH (30° 5′ N., 71° 14′ E.), district, Punjab, India; chief town, M., on Chenab. Pop. of district, 410,000.

MUZAFFARNAGAR (29° 28′ N., 77° 44′ E.), district, Meerut, United Provinces, India; capital, M. Pop. of district, 890,000; of town, 25,000.

MUZAFFARPUR (26° 7′ N., 85° 27′ E.), district, Tirhut Division, Bihar and Orissa, India; chief town, M. Pop. of district, 2,755,000; of town, 48,000.

MUZIANO, GIRALAMO (1528-90), an Italian painter, imitator of Michael Angelo. He also did mosaics.

MYCENÆ, ancient city of Greece, situated on a hill in Argolis; of great importance till its destruction by inhabitants of Argos in 468 B.C. Among remarkable ruins still to be seen are Lion Gate and Treasury of Atreous; important discoveries made by Schliemann. For prehistoric *Mycenaean civilization*, see GREECE (*History*).

MYCETOZOA, MYXOMYCETES, an order of the simplest class (Sarcodina) of Protozoa. For long regarded as plants and placed among the Fungi, these simple Protozoa are distinguished by their plant-like mode of reproduction—by the formation of spores, and by the occurrence in their life-history of temporary or permanent colonies, known as plasmodia, which represent a vegetative stage in development.

MYDDLETON, or **MIDDLETON, SIR HUGH** (*c.* 1560-1631), Eng. contractor; executed the scheme for supplying London with water from Ware, Hertfordshire, by a canal opening into New River Head, Islington.

MYELAT (20° 30′ N., 96° 30′ E.), division, Southern Shan States, Burma, India.

MYELITIS, inflammation of the substance—either the grey matter or white and grey matter—of the spinal cord which may be *acute,* in which the nerve substance is softened, but repair may take place; or *chronic,* in which the change is slower and more in the nature of a degeneration, the nerve substance being replaced by connective tissue. The condition may follow exposure, may be caused by the organisms or toxins of various infectious diseases, or may arise after injury or disease of the spine and its membranes, and it may affect any part of the spinal cord.

MYERS, CORTLAND (ROOSA) (1864), clergyman; *b.* in Kingston, New York. Graduated in 1887 from the University of Rochester and the Rochester Theological Seminary in 1890. Pastor of the First Church, Syracuse, in 1890-1893. From 1893 First Church, Brooklyn and until 1921, Tremont Temple, Boston. Author of *The Best Place on Earth,* 1893; *Midnight in a Great City,* 1896; *American Guns,* 1898; *Making a Life,* 1899; *Why Men Do Not Go To Church,* 1899; *Fielding's Dream,* 1900; *The New Evangelism, The Boy Jesus, The Lost Wedding Ring, The Attractive Church,* 1908; *The Real Holy Spirit,* 1909; *Real Prayer,* 1912; *Where Heaven Touches the Earth,* 1913; *The Man Inside,* 1916; *Money Mad,* 1917.

MYERS, FREDERICK WILLIAM HENRY (1843-1901), Eng. scholar and thinker; known for his work in psychical research; wrote *Human Personality and its Survival of Bodily Death.*

MYERS, HENRY L. (1862), United States Senator; *b.* in Cooper county, Missouri. Educated in private schools and academies. From 1885-1893 at West Plains and Boonville practiced law. The prosecuting attorney of Ravilli county, Missouri from 1895-1899. A member of the Montana Senate for four years, 1899-1903 and a district judge, 4th Judicial District, Montana from 1907-1911. United States Senator from Montana, 1911-1917, 1917-1923.

MYERS, WILLIAM SHIELDS (1866), chemist; *b.* in Albany, New York. Educated in an Albany Academy. In 1888-1889 assistant chemist at New Jersey Experiment Station. A chemist in a chemical works, 1892-1893. At Rutgers College, 1893-1901 an instructor and associate professor of chemistry. Since 1901 a director of Chilean Nitrate Committee for United States and Colonies. For term of 1904-1906 Mayor of New Brunswick, New Jersey. Wrote on soils and clays of New Jersey. From 1918 a special consul of Chile in the United States.

MYGALE, a genus of spiders, the species of which have their eyes placed closely together at the anterior extremity of the thorax. They spin their webs in the form of tubes, in which they reside concealed in holes in the ground, or under stones, or the bark of trees.

MYINGYAN (21° 30′ N., 95° 25° E.), town, on Irrawadi, capital of Myingyan district, Upper Burma; area, 3140 sq. miles. Pop. 18,000; (dist.) 365,000.

MYITKYINA (25° 25′ N., 97° 25′ E.), district and town. Mandalay division Upper Burma; area, 10,650 sq. miles. Pop. 75,000.

MYLODON, a genus of extinct mammals, allied to the megatharum.

MYLONITE, a rock found in metamorphoric regions; fine grained and generally quartzose; consists of powdered rocks crushed by earth movements.

MYMENSINGH, MAIMANSINGH (24° 45′ N., 90° 30′ E.), district, Dacco division, Bengal, India. Pop. 4,000,000.

MYOGRAPH, an instrument for determining the effect of stimulus on muscular fibre. By a suitable arrangement the movement of the fibre is transmitted by a needle to a blackened plate swinging on a pendulum. A tuning-fork vibrating two to three hundred times per second traces on the same plate a time curve, whereby the duration of each phase of movement is determined.

MYOPIA. See EYE.

MYRA (36° 12′ N., 30° 1′ E.); ancient Lycian town, Asia Minor; declined after capture by Harum er Raschid, 808; has interesting remains, including rock tombs.

MYRIAPODA (Gk. *myria,* ten thousand; *pous, podos,* a foot), the class of Jointed Animals (*Arthropoda*) which includes the *Centipedes* and *Millipedes* and three less familiar orders. Its members are land animals, found almost all over the world, but owing to their shy habits and love of darkness they are comparatively little known. They possess many pairs of legs, a distinct head, and long bodies divided into many similar segments. The head bears one pair of jointed antennæ, eyes formed of groups of simple eye-spots, and two or three pairs of jaws. Myriapods occur as fossils as far back as in the Old Red Sandstone of Scotland, belonging to the Devonian age.

MYRICK, HERBERT (1860), publisher and editor; *b.* at Arlington,

Massachusetts. Graduated from Boston University and Massachusetts Agricultural College in 1882. President of a publishing company for a number of years and editor-in-chief of its monthly and weekly magazine. The publisher of current events. Promoted agricultural and educational interests. Director and chairman of Massachusetts banks. Author of *How to Cooperate*, 1891; *New Methods in Education* (with Liberty Todd), 1896; *The American Sugar Industry*, 1899; *Cooperative Finance*, 1912; *The Federal Farm Loan System*, 1916; *Financing Second Mortgages* (as a means whereby tenants may own their farms), 1920. Called the father of the Federal Loan Act of 1916, as he campaigned against the Aldrich bill in 1911-1912 and made this act possible.

MYRMIDONES were, according to Greek legend, an Achæan race which inhabited Phthiotis in Thessaly. Their name is derived from an ancestor, the son of Eurymedusa by Zeus, in the form of an ant, or from the legend of the repeopling of Ægina with ants, changed by Zeus into men. In English, a M. is used for a ruthless subordinate. See *Iliad*, ii., 68; Strabo, viii., 375, ix., 433.

MYRON (V. cent. B.C.), Gk. sculptor; fellow-pupil with Phidias; worked chiefly in bronze, and chose for subjects athletes, animals, and figures in motion.

MYRRH, gum-resin from *Balsamodendron myrrha*; tree of order Amyridaceæ; occurs chiefly in Arabia; used as tonic in medicine, and by ancient Egyptians for embalming.

MYRTLE (*Myrtus communis*), a shrub commonly cultivated in Europe for its fragrant, evergreen foliage; a native of Western Asia.

MYSIA, ancient district, N.W. Asia Minor; belonged in turn to Lydia, Persia, Syria, Pergamum, Rome; traversed by Temnus and Olympus mountains.

MYSOLE, an island in the Indian archipelago, at the extreme northwest end of New Guinea, about 15 m. long and 15 m. wide.

MYSORE (13° N., 76° 40′ E.), native state in Southern India almost entirely enclosed by Madras Presidency; area, 29,444 sq. miles; capital, Mysore. Region consists of tableland broken by hill ranges and valleys; chief rivers, Kistna and Cauvery. State is healthy and prosperous and possesses extensive irrigation system; administration taken over by Brit. Government in 1831; but native dynasty restored, 1881; inhabitants, Hindus; productions include coffee, cotton, rice, silk, sandal-wood, and ivory; gold is mined at Kolar. Pop. 6,000,000.

MYSORE (12° 18′ N., 76° 40′ E.), capital, Mysore, India; contains the maharajah's palace and the residency; carpet-weaving. Pop. 75,000.

MYSTERIES, ELEUSINIAN, a secret worship of highest antiquity, celebrated annually at Eleusis, a small town 14 miles N.W. of Athens. They were connected with the legends of Demeter and Persephone (always styled *Kore* at this festival), Pluto and Dionysus, while less important characters played accessory parts; the abduction of Kore by Pluto and the sorrow of the mother were specially emphasized.

MYSTERY PLAYS. See DRAMA.

MYSTICISM.—A mystic is best defined as one who has intimate spiritual experience of God, so that spiritual realities are so intense that he cannot describe them to others. The two enemies of m. are, it has been said, selfishness and sensuality. Some of the great mystics have been mediæval saints, (*e.g.*), St. Thomas à Kempis, St. Catherine of Siena, some modern (*e.g.*), St. Theresa, some among Protestants. Sometimes mystics see visions and fall into trances, and the mystical temperament is one that is likely to be also emotional.

MYTILENE. See LESBOS.

MYTHOLOGY is a science which investigates the myths or legends of races. The myth proper belongs to a stage in human history when the language is without abstractions, when the mind turns rarely on itself, and outside phenomena are regarded sympathetically and subjectively. In such a stage of development external nature is conceived as endowed with human passions—joys and sorrows, pleasures and pains. Thus the sun would be regarded as issuing from the womb of night, as being bathed in the eastern ocean, as ascending the ladder of heaven, as loosening his golden hair down the sky, as hurling arrows of death, as subduing great cloudmonsters, as sinking in bloody death in the distant west. The wind is a fleet-footed messenger of the gods, a subtle thief, or a moaning spirit in pain. So rains and storms, thunder and lightning, drought and dew, famine and plague, mist and shadow were endowed with all the diverse human attributes and pictured with a wealth of image to which was no limit.

The resemblance in the main body of mythological material of all intelli-

gent peoples is striking in spite of local and tribal diversity of expression and development. Moreover, the m. of most peoples is complex and consists of several strata which mark the progress of migration and conquest. The conquering peoples seldom sweep away the entire body of the aboriginal beliefs, but adopt them as a new inheritance or else transform them to correspond with existing legends. Thus Rome, which was intellectually conquered by Greece, accepted Apollo as a new deity, while other gods of the Gk. pantheon, such as Zeus and Hera, she identified with the native deities Jupiter and Juno, though in character and attributes they were in reality widely dissimilar.

Of myths the sources are various. The most fertile source of myth is natural phenomena, and of natural phenomena the most conspicuous and impressive is the sun. The chief characteristic of the hero of the *solar myths* are benevolence amid severity of fate, and a life spent in great service and toil; the sun being the great day-laborer. But the simplicity of reduction to solar myth has itself been fruitful of error, and whole legends have been classed as purely solar which recent investigation has proved to be quite erroneous. Thus Orpheus was regarded as nothing but a solar hero though there is good reason to believe that he was a hist. person, a Thracian religious reformer. An extreme example of the solar interpretation was the theory formulated that Christ and His twelve apostles were the characters of a solar myth. History frequently does degenerate into myth. Euhemerus in the latter half of the IV. cent. B.C. carried the reduction of myths to a hist. basis to an extreme. Zeus, he thus tried to prove, was a historical personage whose tomb was still extant in Crete. But the hist. source of some myths is undoubted. Thus in Gk. legend the myth of the *d.'s* of Danaus and the *s.'s* of Ægyptus and the legend of the rape of Europa are the fanciful interpretations of traditional migrations. Myths, too, are apt to cluster round ceremonies and ritual whose true significance has become lost. Thus taboos are usually given a mythical foundation. though their origin was originally utilitarian and not sentimental. Allegory is a fertile source of myth, especially where culture has reached some degree of advancement. Thus Sleep, Dreams, and Death appear as mythological personages in the legends of all peoples, though their characters and manner of portrayal may be vastly different.

Again, the myth of the Deluge is almost universal. According to the Gk. myth Deukalion and his wife Pyrrha escaped the flood in an ark, and on the ninth day the waters abated and the ark rested on Mount Parnassus. From the stones of the earth these two survivors created a new race of men and women. The Macusi Indians of S. America have a similar legend, but only one man survives the flood and repeoples the earth with men from stones; while according to the Tamanaks of Orinoko a man and woman surviving the flood repeople the world from the kernels of a certain palm. The flood of Xisuthrus in the Babylonian m. spares all the righteous. In the Hindu version the deluge is universal, but Manu, accompanied by the seven sages, enters the ark and lands on the Mount Naubandhana (the place of the ship's binding).

The resemblances between these stories and the account of the Noachian deluge in the Pentateuch are obvious. Thus m. is no longer regarded by the learned as a treasure-house of profitless delights for poets and children, but as a serious field for science and the indisputable handmaiden to the study of Religion, Philosophy, History, Archæology, and Philology.

MYXŒDEMA, constitutional affection due to fibrous degeneration and loss of function of the thyroid gland, affecting women six or seven times as often as men. The onset of the condition is gradual, and the body is increased in bulk; the skin has a swollen and translucent appearance and usually contains an increased quantity of mucin, the cheeks are flushed and the features coarsened, the hair becomes scanty. In addition, there are mental changes, the intellect is slow, speech and action sluggish, the memory defective, and more serious mental symptoms may ensue.

MYXOGASTRES, MYXOMYCETES, or **MYCETOZOA,** a group of widely distributed organisms numbering some 500 species. Their exact biological position is still a m tter of uncertainty. Some of them were known by the middle of the 19th century, and were understood to be fungi, but the spores on germination, instead of producing germ tubes, give rise to amœboid bodies; these have the power of spontaneous movement, and combine in a solid mass or plasmodium or vegetative condition which remain buried in the matrix or host until it creeps to the surface and produces its spores in a position whence the wind will disperse them. Most Ms. are saprophytes, and some creep over and suffocate seedlings, but a few are parasitic on cultivated plants and trees, causing such destructive diseases as finger-and toe, corky scab of potato, and crown gall.

N

N, the 14th letter of the Eng. alphabet; in sound a nasal dental, produced by holding the mouth in a position required for a dental and forcing the breath to the nose.

NABATÆANS, ancient race inhabiting Syrian-Arabian borderland from Euphrates to Red Sea, *c.* 300 B.C.; migrated to S. Judea and Edom, and ruled Damascus; vassals and allies of Rome, 85 B.C.-105 A.D., when their nationality was destroyed by Trajan.

NABHA (30° 25′ N., 76° 9′ E.), native state, Punjab, India; capital, *Nabha.* Pop. of state, 30,000; of town, 19,000.

NABOB, a corruption of the Hindustani *nawab,* originally used only as a title for native Indian rulers, great officers of the Mogul's court, and governors of provinces. The title was also used for the governor-general of the British possessions. In the XVIII. cent. the title came to be used familiarly for any person who returned from a far country with great riches.

NABUA (13° 25′ N., 123° 30′ E.), town, Ambos Camarines, Luzon, Philippine Islands. Pop. 20,000.

NACHOD (50° 25′ N., 16° 5′ E.), town, on Metau, Bohemia; scene of Austrian defeat by Prussians in 1866. Pop. 12,000.

NADIA, NADIYA, NUDDEA (23° 30′ N., 89° E.), district, Bengal, India. Pop. 1,710,000. Capital, Krishnagar.

NADIR. See ZENITH.

NÆVIUS, GNÆUS (*c.* 264-194 B.C.), Lat. poet; probably a native of Campania. In his plays he attacked the powerful Metelli, for which he was imprisoned. His great poem was an epic called *The Punic War,* written in Saturnian meter.

NÆVUS, tumor composed of dilated capillaries, usually congenital, most common in the skin, often disappearing spontaneously as the child grows up.

NAGA HILLS (26° N., 93° 50′ E.) district, Assam, India. Pop. 110,000.

NAGASAKI (32° 48′ N., 129° 57′ E.); seaport, W. coast Kiusiu, Japan; important shipbuilding center and naval station; exports coal, rice. Pop., 1920, 176,554.

NAGAUR (27° 11′ N., 73° 46′ E.); town, Jodhpur state, Rajputana, India. Pop. 14,000.

NAGINA (29° 27′ N., 78° 29′ E.); town, Bijnaur, N.W. Province, Brit. India. Pop. 23,000.

NAGOYA (35° 7′ N., 136° 56′ E.); city, capital of Owari, on Owari Bay, Japan; XVII. cent. castle; porcelain. Pop., 1920, 429,990.

NAGPUR.—(1) (20° 35′ N., 80° E.); district, Central Provinces, Brit. India; area, 3,843 sq. miles; produces cereals, cotton. Pop. 760,000. (2) (21° 8′ N., 79° 5′ E.), chief town, has trade in grain, salt; manufactures cloth. Pop., 1921, 149,522. Division of N. has area, 23,520 sq. miles. Pop. *c.* 3,728,000.

NAGYKANIZSA (46° 28′ N., 17° E.); town, Zala, Hungary; brick-works; formerly important fortress. Pop. 26,000.

NAGY-KAROLY, cap. of Szatmar co., Hungary, 40 m. E.N.E. of Debreczin. Here is the castle of the Counts Karoly. Has linen and cotton manufs. Pop. 15,000.

NAGY-KIKINDA, a city of Hungary.

NAGY-ZALONTA, a city of Hungary.

NAHE (49° 55′ N., 7° 52′ E.), river, Germany; joins Rhine at Bingen; length, 70 miles.

NAHUM, Old Testament prophet; his book describes judgment on Nineveh for her wickedness; N. is a stern prophet; exact date uncertain, probably *c.* 623 or 608 B.C.

NAIAD(E)S.—In Greek mythology: Nymphs of Fountains.

NAIL, hand-made, till beginning of XIX. cet.; iron, brass, zinc, etc., used; sometimes tinplate scrap utilized.

NAIL. See under SKIN.

NAIRNE, CAROLINE, BARONESS (1766-1845), Scot. poet; wrote *The Land o' the Leal* and other Scot., especially Jacobite, songs.

NAIRNSHIRE (57° 30′ N., 3° 50′ W.), small county, N. of Scotland, bounded by Moray Firth, Elginshire, and Inverness-shire; near coast ferile and well-wooded, other parts principally moorland; chief town, Nairn; largest rivers, Findhorn and Nairn; only industries besides agriculture and fishing, sandstone and granite quarries. Pop., 1921, 8,790.

NAIROBI (1° 20′ S., 37° E.), capital of Ukamba Province, and Government headquarters, Brit. E. Africa. Pop. 14,700.

NAIVASHA (0° 40′ S., 36° 24′ E.), lake, Brit. E. Africa; no outlet.

NAJA. See COBRA.

NAJIBABAD (29° 36′ N., 78° 23′ E.), town, Bijnor, United Provinces, India; metal-ware. Pop. 21,000.

NAKHICHEVAN-ON-THE-DON (47° 12′ N., 39° 42′ E.), town, Don Cossacks, Russia, on Don; tobacco, tallow. Pop. 29,500.

NAKSKOV (54° 50′ N., 11° 8′ E.), seaport, island of Laaland, Denmark; sugar factory. Pop. 8,500.

NAMAQUALAND, GREAT (25° S., 17° E.), region, Africa, N. of Orange River.

NAMAQUALAND, LITTLE (30° S., 18° E.), division, N.W. Part of Cape Province, S. Africa. Pop. 20,000.

NAMES, designations bestowed for convenience upon persons or localities. *Personal.*—A primitive tribe generally takes as its emblem some animal or bird to distinguish it from other clans, hence the members of the tribe which has for its *toten* a beaver are known as *Beavers* or *Beavermen.* Within the tribe itself some appellation is necessary to distinguish each individual member. This leads to the personal name, which may be taken from some natural object, *e.g.* 'Daughter of the Sun,' some deed of prowess, *e.g.* 'The Elephant-Slayer,' or personal attribute, *e.g.* 'The Lame One.'

An ancient Greek was distinguished from his fellows by his ordinary name, the name of his *f.* and of his *deme,* and sometimes of his country, *e.g.* Demosthenes, the *s.* of Demosthenes, the Pæanian, the Athenian. Roman nomenclature was more rigid, generally consisting of the *prænomen* (the predecessor of the 'Christian' name), the *nomen gentile* (which indicated the *gens*), the *cognomen* (which designated the family); sometimes a *cognomen secundum* was added in commemoration of some event or in the case of adoption, *e.g.* Publius Cornelius Scipio *Africanus.*

Modern *surnames* are frequently derived from the occupations or personal descriptions of remote ancestors, *e.g.* Smith, Brown; or are patronymics, Johnson, *Mac*Beth, *O'*Neill, *Fitz*gerald. The *Christian name* grew out of the Jewish practice of giving a personal name to a child on circumcision.

Place Names frequently arose from the nature of the locality, *e.g.* 'Big Water,' 'Black Mountain,' 'Springsure.' In modern times places names have often been taken from names of Persons, *e.g.* Pennsylvania, Brisbane, Port Arthur.

NAMPA, a city in Canyon co., Idaho, 22 miles W. of Boise, the capital. It is served by the Oregon Short Line and Idaho Traction railroads. It is the center of an agricultural and fruit-growing region and has large interests in grain, livestock and dairy products. Gold and silver mines nearby contribute to its prosperity. The great Boise irrigation project includes Nampa in its scope. There are good schools, churches, three banking institutions, and four newspapers and periodicals. The waterworks are municipally-owned. The State Sanitarium is located there. Pop., 1920, 7,621.

NAMUR.—(1) Hilly and fertile prov., Belgium; one-third of surface forested; rich in iron, coal. Area, 1,414 sq. miles. Pop. 352,000. (2) (50° 28′ N., 4° 27′ E.), capital of above; strongly fortified; has XVIII. cent. cathedral; manufactures iron and steel, cutlery, glass and fire-arms. Taken by French, 1692 and 1702. During World War, captured by Germans, Aug. 23, 1914; three forts destroyed. Pop., 1921, 32,274.

NANA SAHIB (*c.* 1820-1859?), stirred up feeling in India against British *raj*; perpetuated Cawnpore massacre in Mutiny; took refuge in Nepal, 1859, where he was probably killed.

NANAIMO (49° 30′ N., 124° W.), city, E. coast of Vancouver Island, Brit. Columbia; exports coal. Pop. 7,800.

NANCY (48° 41′ N., 6° 11′ E.), town, on Meurthe, France, cap. of Meurthe-et-Moselle; with fine churches, old gateways, ducal palace; picture-gallery, univ., etc.; cap. of duchy of Lorraine from XII. cent.; Charles the Bold killed during siege, 1477; taken by France, 1766; chief manufactures, cotton, woolens, paper, iron, chemicals, artificial flowers; famed for embroidery; important railway center; during World War, held by French against Ger. attack,

Aug., 1914. Bombed by Ger. airmen on several occasions, and bombarded by 'Big Bertha.' In all, received 973 projectiles during war, and 476 casualties (177 deaths). Pop., 1921, 113,226.

NANDAIR (19° 9′ N., 77° 23′ E.), town, on Godavari, Hyderabad, India. Pop. 14,500.

NANDGAON (20° 39′ N., 77° 51′ E.), state, Chhattisgarh, Central Provinces, India; capital, Raj-Nandgaon. Pop. of state, 130,000.

NANDI, an East African negro tribe of Uganda.

NANKEEN, a cotton cloth of a peculiar yellow shade, which was originally manufactured in Nanking, China, but has been imitated in other countries.

NANKING (32° 3′ N., 118° 53′ E.), formerly capital of China, now of province of Kiang-su and S. China; situated on right bank of Yangtsze River; once famous for great walls and magnificent buildings destroyed by Taiping Rebels, 1853-64; notably the Porcelain Tower, *c.* 260 feet high. Although recaptured by Imperialists, little progress has been made since; gave its name to *Nankeen* cotton stuffs and Nankeen porcelain; silk manufactures. Pop., 1921, 902,441.

NANNING (22° 43′ N., 108° 3′ E.), city, treaty port, on Yu-kiang, Kwangsi, China. Pop. 300,000.

NANSEN, HANS (1598-1667), Dan. statesman; organized defence of Copenhagen against Swedes, 1658; inspired revolution of 1660 by which monarchy became hereditary and burgesses won equal rights with nobles.

NANSEN, FRIDTJOF (1861), Norweg. scientist, statesman, and explorer; organized first expedition to cross and explore Greenland, 1888; engaged in Polar exploration, 1893-6, in the specially built ship, the *Fram*, which reached latitude 86° 14′ N.; took a leading part in the movement which led to the separation of Norway and Sweden, and was appointed minister to England by the newly formed Norwegian government, 1906; resigned, 1908; appointed prof. of oceanography at Christiania, 1908; chairman of Norweg. association for League of Nations, 1918; in 1919, proposed to the Allies that a neutral commission for the supply of food to Russia should be appointed, but the scheme was rejected by the Bolshevist government, who would not agree to the Allies' condition, that hostilities should first cease. Was requested at fourth meeting of Council of League of Nations, April 11, 1920, to investigate problems connected with the repatriation of prisoners of war. He had direction of relief for Russian refugees, in 1920-23. Writings include *Farthest North, 1897*; *The Norwegian North Polar Expedition, Scientific Results, 1893-6*; *Norway and the Union with Sweden, 1905*; and *Through Siberia, 1914*.

NANTERRE (48° 55′ N., 2° 8′ E.), town, Seine, France; chemicals. Pop. 14,000.

NANTES (47° 13′ N., 1° 33′ W.), city, on Loire, France; river permits ships drawing 20 ft. to reach town; cap. of Loire-Inférieure, with unfinished cathedral, XV. cent. onwards; St. Jacques, XII. cent.; St. Nicholas, 1844; ducal castle, 1466; Palais de Justice, etc.; Roman *Portus Nannetum*; cap. of Brittany in Middle Ages; John Knox served here as a galley slave, 1547-9; Edict of Nantes signed here, 1598; scene of 'Noyades', 1793; chief industries, machinery, leather, nets, hardware, sardines, sugar-refining, soap, chemicals. Pop., 1921, 183,704.

NANTES, EDICT OF, proclamation of Henry IV. of France granting toleration Huguenots; signed at Nantes, 1598. It removed all civil and political disabilities from Protestants, allowed Prot. services to be held under certain regulations, and provided for payment of pastors. Revoked, 1685. See HUGUENOTS.

NANTICOKE, borough in Luzerne co., Pa., about 80 miles N. E. of Harrisburg; located on the Susquehanna River, and served by the Pennsylvania, the Central of New Jersey, and the Delaware, Lackawanna and Western railroads. It is the center of one of the richest coal mining districts in the world, and upon this fact the town's prosperity is chiefly based. The possession of excellent water power has made it also an important manufacturing city. Its chief manufacturing establishments, apart from those dealing with coal and coal products, are hosiery mills, flour, grist and lumber mills, knitting factories and agricultural implement works. There are numerous churches, twelve modern school buildings, three banking institutions, and a newspaper. The city is governed by a burgess and a council. Pop., 1920, 22,614.

NANTUCKET, town, and county seat on Nantucket co., Mass., located about 100 miles S.E. of Boston. The area of the town is about 60 sq. miles, and the site includes the three islands of Nantucket, Tuckemuck, and Muskeget, of which the former is about 15 miles long, with an average width of two miles. The date of the first settlement on the group of islands comprising the town, was 1659, and the largest village of the town, Nan-

tucket, on Nantucket harbor, was founded in 1673. The principal occupations of the inhabitants are agriculture and fishing. An extensive coastwise trade is also carried on. At one time, Nantucket was famous for its whaling industry; but today it is best known as a popular summer resort. Its administrative officials are elected annually at a 'town meeting.' There are good public schools, a high school, numerous churches, a public library, two banks, and a newspaper. Pop., 1920, 2,797.

NANTWICH (53° 4′ N., 2° 31′ W.), town, Cheshire, England; boot and shoe manufactures; brine baths; has cruciform church and old grammar school. Pop. 8,000.

NAPA, city, and county seat of Napa co., Cal., on the Napa River and the Southern Pacific railroad. It is the center of a rich agricultural and fruit raising region, and extensive cement quarries in the immediate vicinity contribute to its prosperity. The river is navigable and enables commerce to be carried on directly with San Francisco and other important cities. Leather goods, shoes and gloves are the principal manufactures. The presence of mineral springs, petrified forests and great redwoods in the vicinity annually attracts great numbers of tourists. There are good schools, handsome churches, three banks and two newspapers. Pop., 1920, 6,757.

NAPHTALI, the sixth *s.* of Jacob, and the head of one of the 12 tribes of Israel.

NAPHTHA, term applied to a group of hydrocarbons, obtained by distillation of shale oil, coal-tar, or petroleum; these differ in composition but are similar in properties; inflammable, volatile liquids used for illumination and as solvents for fats and oisl. Wood N., or wood spirit, is methyl alcohol; the other N's are mixtures of benzene, toluene, naphthene, etc.

NAPHTHALENE ($C_{10}H_8$), a colorless, volatile substance, which crystallizes in plates and has a peculiar tarry smell; obtained from coal-tar; M.P. 79° C., B.P. 218° C.; cause of stoppage of gas-pipes in cold weather; used as disinfectant and in manufacture of artificial indigo; yields *a* and *b* derivatives.

NAPHTHOL ($C_{10}H_7OH$). The two naphthols (*a* and *B*) are monohydroxy derivatives of naphthalene, correspond with the monohydric phenols, which they resemble in properties, and are used as sources of dye-stuffs; *a* naphthol (melting point, 94° C.; boiling point, 280°C.) is prepared from *a* naphthylamine, and is a colorless crystalline substance with a faint smell, soluble in alcohol and ether, but sparingly soluble in hot water. The *B* variety (melting point, 122° C.; boiling point, 286° C.) is soluble in water, its solution giving a green coloration to ferric chloride, while the *a* compound gives a violet coloration.

NAPIER (39° 29′ S., 176° 55′ E.), seaport, N. Island, New Zealand; exports tinned and frozen meat. Pop., 1921, 17,187.

NAPIER AND ETTRICK, FRANCIS NAPIER, BARON (1819-98), Brit. diplomatist; ambassador to Austria, Turkey, Italy, U.S.A., Holland, Russia, and Germany successively; gov. of Madras, 1866; viceroy of India, 1872.

NAPIER, SIR CHARLES (1786-1860), Brit. admiral; became admiral of fleet of Portug. constitutionalists, 1829, and placed Donna Marie on throne; brilliant defeat of Ibrahim Pasha, 1840; his conduct of Baltic fleet in Crimean War was wise, but unpopular.

NAPIER, SIR CHARLES JAMES (1782-1853), Brit. soldier and administrator; *grandson* of 6th baron N. of Merchiston; commanded in Irish rebellion and at retreat to Corunna; captured at battle of *Corunna,* 1809, but released; won fame in Peninsula, in Amer. War and storming of Cambrai; app. 1841, to command army of Bombay against Ameers of Sind; performed feat of destroting Emaun Ghur, 1843; won battle of *Meeanee* against fearful odds and decisive battle of *Hyderabad,* 1843, after which Sind was annexed and N. made governor.

NAPIER, JOHN (1550-1617), Scot. mathematician; *b.* Merchiston, Edinburgh; ed. St. Andrews; afterwards travelled on the Continent, probably studying at Paris; then settled down at Merchiston and Gartness, where he devoted himself to study. In 1614, he published *Mirifici Logarithmorum Canonis Descriptio,* which made him famous all over Europe. In this work he gave among other things, a table of the logarithms of the sines of angles for every minute to 7 figures, but gave no account of how the logarithms were calculated. This was done in *Mirifici Logarithmorum Canonis Constructio,* pub. in 1619, by his *s.* Robert. In 1617, N. wrote a small treatise describing a method of performing multiplication and division by means of a number of small rods, which came to be known as *N's Bones.*

NAPIER, SIR WILLIAM FRANCIS PATRICK (1785-1860), Brit. soldier and historian; took part in famous retreat to Corunna and march of Light Brigade to Talavera, 1809; distinguished himself

hroughout Peninsular War, and wrote ts history, pub. 1828-40; greatest mili- ary historian of England; accurate de- criptions and characterizations, clear, asy style, and great eloquence; wrote *History of the Conquest of Scinde, 1845*; *History of the Administration of Scinde, 851*; etc. His *bro.*, Sir George Thomas N., was a distinguished general and olonial governor.

NAPIER OF MAGDALA AND OF CARYNTON, ROBERT CORNELIS NAPIER, FIRST BARON (1810-90), Brit. soldier; served in Sutlej campaigns, 845-46, and at *Gujrat*, 1849; lieut.-col. f engineers at siege of Lucknow, and von victory at *Powre*, 1858; directed iege of Peking, 1860; commander-in-chief f Ind. forces, 1870-76; gov. of Gibralter, 876-82; field-marshal, 1882.

NAPLES, or **NAPOLI.** (1) (40° 46′ N., 14° 10′ E.), prov., Campania, Italy; he smallest and most densely populated rovince in Italy; contains Mt. Vesuvius n S., rich volcanic soil in N., vineyards; il, corn, hemp, cotton, chestnuts. Area, 51 sq. miles. Pop. 1,320,300. (2) City, ap. of above; largest town in Italy; eautifully situated on N. shore of Bay f Naples, at base of Vesuvius; claims to ossess the finest site in Europe—witness roverb, 'See Naples and die.' Naples onsists of old and new town, with num- rous churches and palaces with paint- igs and sculptures, old gateways, hand- ome streets, and beautiful parks. Out- anding features are: Cathedral of San ennaro, 1272; San Giovanni a Carbon- ar, 1343; San Domenico Maggiore, XIII. ent.; Santa Chiara, XIV. cent.; Santa Maria del Carmine, Monte Oliveto, XV. ent.; S. Severino, S. Angelo a Nilo, XV. ent.; Castel dell' OvO, Castel Sant' lmo, 1343; Castel Nuova, Castel apuano, Castel Carmine; royal palace; ravino (now post office); Caraciolo, ntangelo, and other fine palaces; ational museum, with good art collec- on; univ., 1224; national library; mous Teatro San Carlo; Porta Nolana, orta Capuana, and other old gateways; arthusian convent of San Martino (art useum); the celebrated Campo Santo, d Catacombs of San Gennaro. The rroundings include Pompeii, Hercu- aneum, Sorrento, and the islands of apri and Ischia. Naples was founded Gk. immigrants from Cumæ as *Parthe- pe*; taken by Romans, 328 B.C., and urished under Roman Empire; con- ered by Normans, XI. cent.; long cap. the kingdom of Naples and of the vo Sicilies; leading seaport of Italy, d great trading center; chief industries, acaroni and vermicelli, wine, olive oil, emicals, textiles, lace, leather, paper, rniture, majolica wares, musical instru- ments, shipbuilding, and perfumery. Pop. 697,900.

NAPLES, BAY OF, a fine deep semi- circular sweep of some 50 m. from the Isle of Ischia round to that of Capri, with a low promontory to the N., a mountainous one to the S., while Vesuvius completes, within the bay, a view world famous for its beauty.

NAPLES, KINGDOM OF.—After fall of Rom. Empire of West, 476, Naples ('Continental Sicily') was successively member of Ital. kingdom of Ostrogoths, Byzantine Empire, and exarchate of Ravenna; during Arab invasions she be- came independent republic; conquered, 1130, by Roger II., *grandson* of Norman, Tancred de Hauteville, already Count of Sicily; thus was formed future realm of N. or 'The Two Sicilies,' Roger becoming King Roger I. by coronation of pope, 1130-54. This Norman kingdom pros- pered, its rulers showed characteristic Norman gifts of pliability and tact, and won loyalty of Ital. and Arab subjects.

In 1177, Constance, *sister* and heir of William II., 1166-89, married Henry VI., *s.* of Emperor Frederick I., and became *m.* of the Emperor Frederick II. Henry VI., first Hohenstaufen ruler, was suc- ceeded, 1197, by this *s.*, who made Paler- mo his residence and center of most brilliant court in Europe, restored ruined city of Lucera, and with support of de- voted Muhammadans, turned feudal realm of Normans into strong monarchy. He destroyed nobles' castles, and pro- mulgated new constitution and legal code. On death of his *s.*, Conrad I., 1254, an illegitimate *s.* of Frederick II., seized crown from infant *nephew*, Con- radin; the pope took opportunity to be- stow crown on Charles of Anjou, who slew both Manfred and Conradin, but failed to hold Sicily.

The massacre of the French at *Sicilian Vespers*, 1282, was followed by election of Peter III. of Aragon, *son-in-law* of Manfred, as king of Sicily; Sicily and Naples remained separate kingdoms under houses of Aragon and Anjou until 1442, when, after many wars, Alfonso V. of Castile, overthrew René of Anjou, and reunited the realms. On his death his *s.*, Ferdinand I., 1458-94, succeeded to Naples, but John, *bro.* of Alfonso, re- ceived Aragon and Sicily. Charles VIII. of France revived claim of house of Anjou, invaded Naples, and was crowned king, 1495, but Ferdinand II. recon- quered realm as soon as he retired. Ferdinand of Aragon and Sicily then took Naples from younger branch of Span. house, and reunited realms, 1503.

Austria obtained Naples from Spain by Treaty of Utrecht, 1713, when Sicily was annexed to Savoy; Savoy gave Sicily

in 1718, to Spain, who surrendered it to Austria, 1720; Austria granted Naples and Sicily, in 1735, to Don Carlos on condition of his renouncing claim to Spain; Bourbons ruled till 1799, when Naples was conquered by Championnet, who set up the *Parthenopæan republic.* Bourbons were restored by revolt, 1799, but expelled, and Joseph Bonaparte made king of Naples, 1806. He was succeeded by Murat, 1808. French were expelled by Ferdinand IV., 1815, who as Ferdinand I. again united Naples and Sicily; insurrections took place, 1848; conquest by Garibaldi, 1860. Naples was annexed to Piedmont, 1861.

NAPOLEON FAMILY. See BONAPARTES,.

NAPOLEON I., NAPOLÉON BONAPARTE (1769-1821), Emperor of the French; was *b.* at Ajaccio in Corsica—a Fr. subject, though of Ital. extraction; studied, 1779-1784, at the military school of Brienne; in 1784, at that of Paris. In 1785, he received a commission in an artillery regiment. From 1789-92, he was chiefly in Corsica. Obliged to fly to France, in 1793, he entered into relations with the Montagnards, in particular with the younger Robespierre, and there can be no doubt that at this time he was a hot Jacobin. He first won military distinction at the siege of Toulon, and played a considerable part in the fall of that city, Dec., 1793. Bonaparte then proceeded to the Army of Italy, where he was said to display 'transcendent merit,' and was responsible for many of the military plans. So deeply was he identified with the Robespierrists that after Thermidor, he was suspended and imprisoned. After his release he was employed in the War Office, and at Vendémiaire was entrusted with the task of suppressing the rising in Paris, 1795. In March, 1796, he was given the command of the Army of Italy. With extreme rapidity he fell first on the Austrians at Montenotte, Millesimo, and Dego, then on the Sardinians at Ceva and Mondovi. Sardinia was forced into the Treaty of Cherasco, April 28, 1796, and Bonaparte turned upon the Austrians, defeated them at Lodi, May 10, and entered Milan, May 15. Then followed the struggle for Mantua and the battles of Castiglione, Aug. 3; Arcola, Nov. 15-17; and Rivoli, Jan. 14, 1797. Mantua capitulated on Feb. 2; and Austria agreed to preliminaries of peace at Leoben, April 18, which crystallized into the Treaty of Campo Formio, Oct. 17, 1797. Bonaparte had already organized Lombardy as a republic, and had forced the Pope to sign the Treaty of Tolentino, March. He returned to Paris in Nov., and obtained leave to attempt the conquest of Egypt; this was meant to be the preliminary of a blow at India. He landed in Egypt on June 30, 1798, having captured Malta on the way, June 9, took Alexandria, and defeated the Mamelukes in the battle of the Pyramids, July 21; but the destruction of the Fr. fleet by Nelson in Aboukir Bay completely ruined his plans, Aug. 1. In Feb., 1799, he invaded Syria, but was thwarted in an attempt on Acre by Sir Sidney Smith, and an Eng. squadron. 'This reverse,' he said 'changed the destiny of the world.' Returning to Egypt, Bonaparte defeated the Turks at Aboukir, July 25, 1799. But hearing of the successes of the second coalition and the political crisis in France he returned home, in Oct., 1799.

The Directory was by this time moribund, and thoughtful men like Talleyrand and Sieyès were looking about for a man of action to restore the fortunes of France. Sieyès was the real author of the *coup d'état* of Brumaire, which placed Napoleon at the head of the government as 'First Consul,' the other two being Ducos and Sieyès himself, Nov. 9, 1799. Bonaparte was confronted with a grave military situation. Italy was almost completely lost, and the only hope seemed to be that Moreau (who was in Switzerland) might be able to march direct upon Vienna. But Bonaparte desired to strike the blow himself. He therefore led an army over the Alps and won the great, but lucky, victory of Marengo, June 14, 1800, which completely discounted Moreau's victory of Hohenlinden, Dec. 3. On Feb. 9, 1801 the emperor signed the peace of Lunéville, which, broadly speaking, reproduced the conditions of Campo Formio. Bonaparte now hoped to be able to isolate England, and to form a great coalition (Russia, Prussia, Sweden, and Denmark) against her. At the battle of Copenhagen, Nelson forced the Crown Prince to make an armistice; and the murder of the Tsar Paul brought the brief Franco-Russian *entente* to an end. After this there was nothing for it but for France to make terms with England, and on March 27, 1802, the Peace of Amiens was signed.

Bonaparte now turned to civil affairs. The concordat with the Pope had already been signed; it ended the ecclesiastical discord which had been provoked by the unwise 'Civil Constitution.' The First Consul now threw himself into the task of reconstructing Fr. institutions. He founded the university, and revised the judicial system, codified Fr. laws, established a complete system of local government, and created the Bank of France and the Legion of Honor. Not all these institutions were established at once, but the bulk of the work was done during

the period of peace, 1801-3. This record of reform is sufficient proof of the First Consul's genius as a ruler as well as a soldier.

Bonaparte had long ago realized that the true enemy of France was England. Rivalry with England made him rekindle the war. Malta was the ostensible cause of the rupture; but England had also been provoked by the annexation of Piedmont, Parma, and Piacenza, the reconstitution of Switzerland, and finally by the violation of Hanover. At the moment of the rupture of the Peace of Amiens Bonaparte seized the opportunity of establishing his dynasty. It was a period of plots. So early as 1800 an attempt had been made on the life of the First Consul with an infernal machine, and Bonaparte had arrested and transported all the leading Jacobins. Now, in 1803, royalist plots aroused public feeling. The plotters, including Pichegru and Moreau, were arrested, and on March 15, 1804, Bonaparte demonstrated that he too was ready to shed the blood of the Bourbons by causing the seizure and summary execution of the Duc d'Enghien, a cadet of the house of Condé. On May 18, 1804, Bonaparte assumed the title of Napoleon I., Emperor of the French. His goal was now England. A great army and flotilla were prepared at Boulogne. Austria and Prussia were soothed into quiescence, and all that was required to accomplish the invasion was temporary command of the sea. Napoleon never obtained his opportunity, and the Fr. and Span. fleets were destroyed at the battle of Trafalgar, Oct. 21, 1805. Meanwhile, Napoleon had busied himself with the rearrangement of Italy; the Ital. republic was converted into a kingdom, and Napoleon assumed the iron crown, July 26, 1805. The Ligurian republic was also annexed. By this time the preparations of Austria and Russia had diverted Napoleon's gaze from the Channel to the Danube. With marvellous rapidity he swept down upon Austria, and surrounding her main army at Ulm, caused it to surrender, Oct. 21, 1805. Pushing on through Vienna, he next inflicted a terrible defeat on the Russians and Austrians at Austerlitz, Dec. 2, the first of his 'grand' battles, and the one which he always considered his military masterpiece. Austria was obliged to sign the Peace of Pressburg, Dec. 26, which deprived her of a sixth part of her territory. By it the Confederation of the Rhine was formed under Napoleon's protection. On Aug. 6, 1806, the Holy Roman Empire ceased to exist.

All this time Prussia had been cleverly kept neutral. Now that Austria was powerless to help, Napoleon promptly forced hostilities on her. From his base in Bavaria he made a direct thrust at Berlin, and completely annihilated the Prussian resistance in the double battle of Jena and Auerstädt, Oct. 14, 1806. On Oct. 28, he entered Berlin and issued the Berlin Decree, which consummated his policy of a commercial blockade of Eng. goods on the Continent, Nov. 21. He now pressed on against the Russians, fought the bloody but indecisive battle of Eylau, Feb. 7-8, 1807, and won the decisive victory of Friedland on June 15. He then resolved to make Russia his ally, and signed with the Tsar Alexander I. the Treaty of Tilsit, July, 1807. Prussia was partitioned, and a Napoleonic kingdom of Westphalia was constituted for Napoleon's brother, Jerome.

Napoleon now directed his attention to the Span. peninsula, where the presence of a Bourbon dynasty was an obvious menace. Junot was sent to conquer Portugal. In May, 1808, the Span. king was enticed to Bayonne, and by malevolent cunning tricked into abdicating. Napoleon made his brother, Joseph, king of Spain. The Span. people rose in fury, and England, seeing her opportunity, landed troops in the Peninsula. It was the primary cause of Napoleon's downfall.

Seeing the drain on Napoleon's resources caused by the entanglement in the Peninsula, Austria now once more ill-advisedly declared war. Napoleon drove the Austrians from Ratisbon and occupied Vienna, May 13, 1809, lost the terrible battle of Aspern or Essling, May 21-22, but, on July 4, defeated the Archduke Charles at Wagram. On Oct. 14, Austria signed the Treaty of Schönbrunn. Napoleon now decided to divorce his wife, Josephine de Beauharnais (whom he had married in March, 1796, on the eve of his departure to take command in Italy) and to espouse the Archduchess Marie Louise of Austria. This, added to the strain of the 'continental system,' marks the beginning of the alienation of Russia; and in the year 1811, the alliance of Tilsit broke up, Tsar Alexander having in the meantime gained over to his side Sweden (of which Bernadotte, a Fr. general, had become king, in 1810). In 1812, Napoleon invaded Russia. The Russians withdrew in front of him. There was a frightful battle at Borodino, Sept. 7, 1812, and then Moscow was occupied and burnt. After this Napoleon was obliged to retreat, and in the retreat practically the entire army perished.

Encouraged by this disaster to their enemy, the Prussians re-entered the war. This time the entire Prussian people rose against Napoleon; and he, with the grand army lying dead in Russia and half his available troops engaged in Spain, was not the opponent he had been. His own

military genius, however, was unabated, and he won the battles of Lützen and Bautzen, May 2, and May 20-21, 1813. Austria's decision to join the coalition turned the tables. A series of minor defeats balanced by a single victory was followed by the decisive catastrophe of Leipzig, Oct. 14-19, 1813. The allies now carried the campaign into France. Napoleon fought with consummate skill, but was powerless against overwhelming numbers. On April 11, 1814, he was compelled to abdicate, and Louis XVIII. assumed the crown. In March, 1815, Napoleon escaped from his confinement at Elba. France rallied to him, and he once more challenged the coalition. The battle of Waterloo, June 18, was the answer to this challenge. Napoleon surrendered himself to the English, and was relegated to the island of St. Helena, where, in 1821, he *d.* His body was conveyed to France, in 1840, and laid in the Invalides in Paris.

The episode of Napoleon is perhaps the most remarkable and fascinating in modern history. His elemental genius plunged into the complicated and chaotic conditions created by the Fr. revolution, and acted with almost magical effect. Unhampered by tradition, unmoved by moral or religious influences, he was, as nearly as it is possible to be, sheer intellect, stalking through the world, bringing all problems straight to the touchstone of his ardent brain. Endowed with a simplicity which rejected all but essentials, he was not only a supreme logician but a supreme idealist, and it was excess of logic rather than excess of idealism that ruined him in the end.

Of his military genius it may safely be said that it has never been surpassed. He established new methods and standards of warfare, reduced campaigns and battles—so far as it is possible to do so—to mathematical problems; but while doing so he never lost sight of the element of uncertainty, the personal element, and the need for intuition—the 'divine' element in warefare, as he called it. He was only 46 years old when his career came to a close.

NAPOLEON II., NAPOLÉON FRANCOIS CHARLES JOSEPH (1811-32), titular emperor of French; *s.* of Napoleon I., by second wife, Marie Louise, Archduchess of Austria; was created 'King of Rome' at birth. After his father's downfall he withdrew to Austrian court and lived as Duke of Reichstadt; is the hero of E. Rostand's play *L'Aiglon, 1899.*

NAPOLEON III., CHARLES LOUIS NAPOLÉON BONAPARTE (1808-73), last emperor of the French; *s.* of Louis Bonaparte (*bro.* of Napoleon I.) and of Hortense Beauharnais, *dau.* of Josephine. On his *bro's* death, Napoleon assumed headship of family, and sought Bonaparte restoration; failed in an attempt at Strasbourg against the government, 1836, and was deported to America; pub. *Des Idées Napoléoniennes, 1839*; was captured in attempted invasion of France, 1840, and condemned to perpetual captivity. He escaped, 1846, and lived a gay society life in London. The revolution of 1848, brought about his return; he was elected president, and in 1851, carried out a *coup d'état* overthrowing the constitution.

Napoleon was declared emperor, 1852. All threads of administration were collected in his hands, and popularity was obtained by showy court, handsome public works, lowering of price of food and hours of labor. He married Eugénie de Montijo, 1853. His career was crowned by Franco.-Brit. victories in the Crimea. He supported Italy in its War of Liberation, but the cession of Nice and Savoy to France by the Treaty of Turin, 1860, shows that he was not altogether disinterested. From 1860 to 1870, Napoleon steadily lost ground. Russia was offended by his Polish policy, 1863; failure of Mexican expeditions, 1863-7, brought further loss of prestige, and all hope of reviving glory of France was lost by Prussian defeat of Austria, 1866. The growing strength of republican and constitutional party at home extorted concessions. Napoleon's foreign policy, a fruitless attempt to endear his dynasty to the people by foreign conquest, brought on Franco.-Ger. War 1870. Napoleon surrendered at Sedan, and was deposed, 1870. He lived in England till his death. His only *s.*, the Prince Imperial, was killed in the Zulu War, 1879, and his widow survived until 1920.

NAPOLEON, PRINCE LOUIS (1864), *bro.* of Prince Victor Jérôme Frederic Napoleon; entered Russian military service, become a major-general, and commanded cavalry division of Caucasus at Tiflis; was for a time gov.-gen. of province of Coraven.

NAPOLEON, PRINCE VICTOR JÉRÔME FREDERIC (1862), head of the Napoleon family; is the eldest *s.* of Prince Napoleon and Princess Marie Clothilde of Savoie; was expelled from France, 1886, and in 1910 married H.R.H. Princes Clementine of Belgium. He inherited the fortune of the late Empress Eugénie, 1920.

NAPOLEONITE, a stone sometimes called Corsite, because found in island of Corsica; a variety of dolerite; often cut and polished for ornamental purposes.

NARA (34° 45′ N., 135° 45′ E.), town, Yamato, Japan; contains gigantic statue of Buddha, and many beautiful temples; formerly capital of Japan. Pop., 1919, 47,515.

NARA, EASTERN and WESTERN (*c.* 27° 20′ N., 68° E.), two water channels, Sind, Brit. India.

NARAINGANJ (23° 37′ N.; 90° 32′ E.), town, Dacca, Bengal, India; entrepôt for jute. Pop. 26,000.

NARBONNE (43° 11′ N., 3° E.), town, Aude, France; with cathedral, Church of St. Paul, and abp.'s palace; Rom. *Narbo Martius*; united to France, 1507; famous for white heather, honey, and red wine. Pop. *c.* 29,000.

NARCISSUS (*Narcissus poeticus*), a favorite garden flower. The plant is bulbous, and the blooms resemble those of the *Liliaceæ*, except that the ovary is inferior, and that a portion of the perianth is modified to form a discoid corona. The fruit is a trilocular capsule.

NARCISSUS (classical myth.), beautiful youth, *s.* of Cephissus and Leirope; fell in love with his own reflection and pined away; changed into flower bearing his name.

NARCOTICS, drugs which, when administered in sufficient quantity, produce stupor which may go on to profound coma, paralysis, or convulsions, and even eventually death. In small doses, various N's act in different ways, some being stimulants, some producing delirium, some acting as intoxicants, some producing sleep, while the most evident property in some is their power to relieve pain. The chief N's are *opium* (and the most important alkaloid it contains, *morphine*), *heroin*, *cannabis indica*, *bella-donna* (and its alkaloid, *atropine*), *stramonium*, *hyoscyamus*, *chloral hydrate*, and *alcohol*. See DRUG ADDICTION.

NARCOTINE ($C_{22}H_{23}NO_7$), an alkaloid occuring in opium. Discovered in 1803, and thought to be the stimulating principle of opium, but it has really little activity as a narcotic. It is nearly insoluble in water, sparingly so in alcohol, and readily soluble in chloroform and ether. It has slightly alkaline properties, is a derivative of benzyl-isoquinoline, and has a large number of decomposition products, of which 'vanillin' is well known as the flavoring principle of vanilla. Its salts are not readily crystallizable, are more bitter than morphia, and its sulphate is used instead of quinine in India.

NARES, SIR GEORGE STRONG (1831-1915), Brit. sailor; entered navy, 1845; took part in Franklin Search Expedition, 1852-4, and commanded *Challenger* in earlier part of her scientific expedition, 1873-6; also commanded Arctic Expedition, 1875-6, and was professional officer of Board of Trade, 1879-96; was promoted vice-admiral, 1892. Author of *Seamanship*, *Reports on Ocean Soundings and Temperature*, *Narrative of a Voyage to the Polar Sea*, etc.

NARGHILE OR NARGILEH, a form of tobacco pipe smoked in the East. The smoke is made to pass through water by means of a pipe.

NARNI (42° 32′ N., 12° 30′ E.), town; ancient *Narnia*, Perugia, Italy; bp.'s see; cathedral. Pop. 12,500.

NARO, a town of Sicily. Pop. about 13,000.

NARRAGANSETT BAY. An arm of the Atlantic, extending 28 miles in Rhode Island. It is about 8 miles wide at the entrance from Sakonnet Point to Point Judith. The principal arms of the bay are Mount Hope Bay on the E., and Greenwich Bay on the W. The Providence River enters it at the head, Taunton from the E., and Pawtucket from the W. Of the islands, Rhode Island is the largest, then Conanicut, Prudence, and Hog Islands. Principal cities on the bay are Providence, Newport, and Fall River.

NARRAGANSETT PIER, town in Washington co., R.I., about 28 miles from Providence, and located on Narragansett Bay and the Narragansett Pier Railroad, which connects it with the New York, New Haven and Hartford Railroad. It is one of the most beautiful and famous summer resorts in New England. The great pier from which the town takes its name was built in 1815. The town and its environs are dotted with handsome estates, beautiful villas, and sumptuous hotels, and the facilities afforded for boating, fishing and swimming are of the finest. The first settlement was in 1675, and the place was noted in early Colonial history for the struggles that took place with the Indians. There are good schools, churches, a bank and a newspaper. Pop. about 1,400.

NARRAGANSETTS (Indian tribe).—Their territory was what is now Rhode Island, and the E. part of Long Island. When the Pilgrims arrived, Canonicus, the chief, sent a bundle of arrows wrapped up in a rattle-snake skin. Governor Bradford replied in kind, by returning the rattle-snake skin filled with powder and shot. The chief was shrewd enough not to press hostilities. Many

of his people helped the colonists in the Pequot War. During King Philip's War, King Philip took refuge with the Narragansetts in the winter of 1675. The colonists, believing that he would induce them to join him, attacked and destroyed their fort and slew about 1,000. From that date, the Narragansetts carried on continuous warfare against the whites. Of the once powerful tribe, only a few remain in Rhode Island.

NARSES (*c.* 475-573), statesman and general of Byzantine Empire; native of Persarmenia; brought up in imperial household, a eunuch, and rose to be important official; in 'Nika' revolt, 532, N. saved Justinian by lavish distribution of bribes; sent to aid Belisarius in Italy, 538, and purposely hampered him; defeated Goths of Italy, 552, and Alamanni and Franks at great battle of *Capua*, 554; captured and hanged king of the Heruli, 565; made prefect of Italy, and rebuilt cities destroyed by barbarians, but was recalled on charge of extortion, 567, and in revenge delivered over Italy to Lombards of Pannonia.

NARSINGHGARH (23° 42′ N., 77° 5′ E.), native state, Bhopal Agency, India; capital, Narsinghgarh. Pop., of state, 120,000; of town, 9,000.

NARSINGHPUR (23° N., 79° E.), district, Nerbudda, Central Province, Brit. India; capital, Narsinghpur. Pop. of district, 320,000; of town, 13,000.

NARVA, NAROVA (59° 22′ N., 28° 6′ E.), seaport, on Narva, St. Petersburg, Russia; cottons, woolens. Pop. 35,000.

NARVACAN (17° 30′ N., 120° 30′ E.), town, Ilocos Sur, Luzon, Philippine Islands. Pop. 17,000.

NARVAEZ, PANFILO DE (*c.* 1480-1528), a Spanish soldier, *b* at Valladolid. He went to America, and from 1512 was under Velasquez in command of an auxiliary force in the conquest of Cuba. In 1520 he was sent to supersede and punish Cortes, but was defeated at Cempoala and deserted by his army. Having returned to Spain he was appointed governor of Florida in 1526, but was drowned in 1528 in the Gulf of Mexico.

NARVIK, VICTORIAHAVN (68° 30′ N., 17° 20′ E.), seaport, Nordland, Norway.

NARWHAL, OR SEA UNICORN (*Monodon monoceros*), a cetacean, allied to the dolphins and porpoises. The male has one—almost invariably the left—of the teeth or tusks in the upper jaw extraordinarily developed into a spirally furrowed horn of pure ivory from 6 to 10 ft. long. This is the longest tooth found in the Mammalia. The adult animal is from 10 to 16 ft. long. It has a grey back, mottled with black, the under parts being much lighter, but also spotted. It has a blunt short head, no dorsal fin and very small flippers, but is very active and a rapid swimmer. It is peculiar to the Arctic Ocean, though it occasionally strays as far S. as British seas. The oil is valuable and the flesh edible.

NASEBY (52° 24′ N., 0° 59′ W.), village, Northamptonshire, England, near which Roundheads under Cromwell and Fairfax gained decisive victory over Royalists, in 1645.

NASH, CHARLES SUMNER (1856), theologian; *b.* at Branby, Hampshire co., Mass.; *s.* of Lorenzo Smith and Nancie Swingington Knight Nash. He was educated at Amherst University, and at Hartford Theological Smeinary. He was ordained a Congregational minister, in 1884, and was pastor of the First Church, East Hartford, Conn., until 1890, after which he was an instructor in elocution and Bibl. theology at Hartford Theological Seminary for one year, and then became connected with the Pacific Theological Seminary (now Pacific School of Religion), where he was president and professor of church polity from 1911-20, and then president emeritus and professor of church polity. Author of *Our Widening Thought of God, 1914*.

NASH, RICHARD, OR 'BEAU NASH (1674-1762), *b.* at Swansea. He made his living by gambling, and was noted for his extravagance. In 1705 he went to Bath, where he established the Assembly Rooms and became the recognized autocrat of the town, and was admired for his manners and taste. He was also mainly instrumental, with Ralph Allen and Dr. Oliver, in establishing the mineral-water hospital at Bath.

NASHE, THOMAS, NASH (1567-1601), Eng. writer; *b.* Lowestoft; extraordinary good-nature in face of misfortune made him universally beloved; wrote poetry, plays, and pamphlets; a pioneer novelist; works include *Anatomie of Absurditie*, *Pierce Penilesse*, and *The Unfortunate Traveller*.

NASHUA, a city, and one of the county seats of Hillsboro co., N.H., located about 38 miles N.W. of Boston, Mass., on the Boston and Maine Railroad. Its first settlement dates back to 1655, and it was incorporated as a city in 1853. It is an important industrial center, excellent water power being furnished by a canal whose waters are drawn from the Nashua River. Its leading

manufactures are shoes, iron and steel products, saddlery, hardware, cotton goods, stationary engines, caskets, and furniture. It is a headquarters for the U.S. Fish Hatchery. There are numerous and handsome churches, fine city, county and private buildings, an excellent public school system, two academies, five banking institutions, and three newspapers. The city is governed by a mayor and a board of 15 aldermen. Pop. 1920, 28,379.

NASHVILLE, capital and second largest city of Tennessee, and county seat of Davidson co., located on the Cumberland River, and served by the Tennessee Central, Louisville and Nashville, and Nashville, Chattanooga and St. Louis railroads. It has an area of 18.2 sq. miles, and is one of the most prosperous and progressive cities of the South. It is the most important industrial center of the state. Its chief manufactures are flour and grist-mill products, cotton goods, clothing, harness, stoves, ranges, tobacco, carriages, confectionery, fertilizers, and timber products. It carries on an extensive wholesale trade in boots and shoes, drygoods, drugs, paper, and hardware. Coal mines of the highest quality exist in the immediate vicinity of the city. There are numerous and costly public and business structures, including the State Capitol, City Hall, County Court House, Confederate Soldiers' Home, Tennessee School for the Blind, Tennessee Industrial School, handsome churches, theatres, and magnificent private homes and estates. The city is beautifully laid out, with splendid wide and well-paved roads, and an elaborate park system, comprising 480 acrea. Its educational interests are second to those of no Southern city. Within its limits are located Vanderbilt University, the University of Nashville, Boscobel College, Fisk University, Roger Williams University, Buford College, Walden University and the George Peabody College for Teachers. The principal libraries are the Carnegie, the State Library, and that of the Tennessee Historical Society. There are excellent public schools for both white and colored pupils. The waterworks and electric lighting plant are municipally owned. The city is under the commission form of government. Pop., 1920, 118,342.

NASHVILLE, BATTLE OF. Fought during the Civil War, near Nashville, Tennessee, December 15-16, 1864, between General Thomas and about 48,000 Federal troops, and General Hood with 26,000 Confederates. When General Sherman started on his march to the sea from Atlanta, November 15, 1864, General Hood's Confederates force supplemented by Forrest's cavalry, was on the Tennessee River preparing for an advance on Nashville, where for six weeks Thomas had been making preparations to withstand an attack. Schofield's 23rd Corps and Stanley's 4th Corps in the last week of October had been ordered to Pulaski to delay Hood's advance and give Thomas more time to strengthen his position at Nashville. In the battle that took place, December 15-16, near Nashville, Hood's army was routed and almost destroyed. The Federals lost 3,000 in killed and wounded, and took 4,400 prisoners. The losses of the Confederates are not otherwise recorded.

NASIK, a district in Bombay, British India. Area, 5,850 sq. m., pop. about 825,000.

NÂSIR KHOSRAU (1004-88), first Persian poet; spent studious youth enlivened by much wine-drinking and revelry; converted *c.* 1050, and went on pilgrimage to Mecca; the journey he described in *Safarnama.* Later his energies were employed in propagating Shi'a doctrines.

NASMYTH, ALEXANDER (1758-1840), a portrait and landscape painter, *b.* in Edinburgh. He was a pupil of Allan Ramsay. In 1778 he established himself in Edinburgh as a portrait painter, and had Robert Burns among his sitters. But having a preference for landscape painting, he ultimately confined himself to this branch, although much of his time was occupied in teaching, and in 1822 published sixteen views of places described in the Waverley novels. He was a member of the original Society of Scottish Artists, and an associate of the Royal Institution.

NASMYTH, JAMES (1808-90), Scot. engineer; *b.* Edinburgh; *s.* of Alexander N.; invented steam-hammer, 1839.

NASSARAWA (*c.* 8° E., 8° 40′ N.); province, Brit. N. Nigeria; area, *c.* 18,000 sq. miles; native insurrection in 1900 subdued by Brit. force; produces cotton, rubber. Pop. 1,400,000.

NASSAU.—(1) (50° 30′ N., 9° E.); district, Hesse-Nassau, Germany, bounded S. and W. by Rhine and Main, N. by Westphalia, E. by Hesse; surface mountainous; cap. Wiesbaden. An independent duchy from 1806, Nassau was incorporated with Prussia, 1866; younger branch of Nassau family founded house of Orange-Nassau. District has numerous mineral springs; famous wines. Area, 1,830 sq. miles. Pop. 465,600. (2) (25° 5′ N., 77° 21′ W.), formerly New Provi-

dence, seaport, town, cap. of Bahama Islands; winter resort; trades in sponges, pearls, sisal fiber, fruit. Pop. 11,000.

NAST, THOMAS (1840-1902), American cartoonist; *b.* in Landau, Bavaria, September 27, 1840; *d.* in Guayaquil, Ecuador, December 7, 1902. His *m.* brought him to the United States in 1846. He became the door-keeper of a New York art gallery in which he copied the pictures, but had only six months' lessons in drawing. Frank Leslie sent him to England, in 1860, to make pictures of the Heenan-Sayers prize-fight for the *Illustrated News*. The next year he made drawings of the Italian campaign. In 1862, he joined *Harper's Weekly*, in which his most famous cartoons appeared. Especially noted were those on the Tweed Ring of New York City, published in 1871-1873. He left *Harper's*, in 1887, and worked for the *Pall Mall Gazette*, in 1894. In 1902, he was appointed U.S. Consul at Guayaquil, Ecuador, where he *d.* of Yellow Fever.

NASTURTIUM, INDIAN CRESS, hardy annual, originally native of Peru; climbs by leaf-stalk; possesses five sepals and eight unequal stamens, while the flowers are yellow, with characteristic smell. Besides various varieties of *Tropæolum magnus*, there is the Water-cress, *N. officinale*, which is used as a salad preparation.

NATAL (26° 30′-31° S., 29° 33′ E.), an original prov. of the Union of S. Africa, on S.E. coast of Africa; bounded on S.W. by Cape of Good Hope Prov. (Pondoland and Griqualand E.), W. by Basutoland and Orange Free State, N. by Transvaal and Port. E. Africa; seaboard (washed by Ind. Ocean) *c.* 370 miles. Zulu coast has shallow lagoons. From coast, surface rises over 5,000 ft. in series of ledges with many hills and valleys to lofty Drakensberg Mts. on W. border; has numerous rivers and streams (chief Tugela), not navigable. Climate is healthy; coast districts semi-tropical, but practically fever-free.

Most important industry is sheep farming, in midland and upland districts. Cattle are reared everywhere, but have suffered badly from E. coast fever and lung-sickness. Angora goats and horses thrive in higher regions. Agricultural products vary according to the situation; over 1,000,000 acres are cultivated, half by natives and Indians. On coastal belt (25 to 30 m. wide) sugar-cane, coffee, tea, and cotton are grown, plantations being worked by Ind. coolies; wheat is limited to Upper Tugela districts and country round Dundee and Estcourt. Wattle bark is grown largely in midlands. Maize grows everywhere, and is chief grain crop, exports increasing rapidly. Nearly every fruit flourishes; orchards mostly on coast, where bananas, pine-apples, etc., grow; citrus fruits from coast and midlands are exported; other products include tobacco, kaffir corn, lucerne, sweet potatoes, and vegetables. Forests are small, some blue-gum plantations. Irrigation is easy and most profitable. There are several government and other irrigation settlements. Chief mineral is coal—principal mines at Newcastle and Dundee; a most promising industry; output, 1920, 3,000,000 tons; mostly exported and used for bunkers. Copper, gold, silver, iron, nickel, manganese, tin, asbestos, gypsum, limestone, and oil shale also found. Manufactures are few and small (fruit canning, sugar, tea factories, etc.). Fish abound in coastal waters; Durban has whaling station.

Elementary education is under provincial control; government and government-aided schools; separate schools for natives, Indians, and colored children; Natal Univ. Coll., Maritzburg, under Union Government.

Purely provincial affairs are managed by administrator and provincial council; provincial cap., Pietermaritzburg; largest town and port, Durban. Railways (mileage, *c.* 1,302) run along the coast and inland across the Drakensbergs to Johannesburg and Bloemfontein. Natal long competed with Cape ports and Lourenco Marques for Rand carrying-trade; traffic finally apportioned by an agreement, Natal getting 25 to 30 per cent.

Natal was discovered, Christmas Day, 1497, by Port. mariner, Vasco da Gama, and accordingly christened by him *Terra Natalis* (land of the Nativity). European settlement, however, dates only from 1823-4, when Eng. explorers landed and obtained land grant from Zulu king Chaka, whose military genius had made him master of all S.E. Africa, and whose relentless cruelty had transformed a once populous land into a desolate waste. This Eng. settlement protected tribes which fled from Chaka's ruthless sway, and was broken up by Dingaan, who assassinated and succeeded Chaka. Brit. colony at Durban founded 1835. In 1835, a body of Boers (under Retief) who had trekked inland from the Cape, entered Natal from the N., and were treacherously massacred at Weenen (*i.e.*, 'weeping') by Dingaan. A punitive expedition from Durban was wiped out, but the Zulu was routed by Dutch under Pretorius, 1838. A Dutch republic, 'Natalia,' was proclaimed, 1840; hostilities broke out between British and Boers; Natal was declared a Brit. colony, 1843, and Boers withdrew to N.; Natal annexed to Cape, 1845; made separate col-

ony, 1856; Cetewayo succeeded as Zulu king, 1872; on his refusal to disband forces, war was declared, 1879. British were defeated at Isandhlwana, but gallantly held Rorke's Drift, Jan. 22, 1879, averting invasion of Natal; Brit. reinforcements crushed Zulu *impis* at Ulundi July 4, and Cetewayo was captured and exiled. In Boer War, 1880-1, fighting took place on Natal border. Native troubles continuing, Cetewayo was restored, 1883: *d.* 1884; Zululand annexed as crown colony, 1887; Dinizulu, Cetewayo's *s.* and successor, rebelled, but was exiled to St. Helena, 1889; responsible government granted, 1893; Ingwavuma, between Swaziland and Amatongaland, incorporated in Zululand, 1895; Zululand made part of Natal, 1897; Natal invaded by Boers during S. African War, 1899-1900; portion of S. African Republic S. of Pongola R. added to Natal, 1902; rising under Bambata and Siganandi, 1906 suppressed by colonists; Natal merged in Union of South Africa, 1910. Area, including Zululand, 35,291 sq. miles. Pop. (white) 137,000; (colored) 1,100,000. See Map of Africa.

NATAL (5° 48′ S., 35° 13′ W.), city capital, Rio Grande do Norte, at mouth of Rio Grande, Brazil; exports cotton, sugar. Pop. 13,000.

NATCHEZ (Indian tribe). — Early French settlers found them occupying territory in the lower Mississippi Valley, including the site of the present city of Natchez. Chateaubriand, and other writers have drawn fanciful pictures of the Natchez, whom they describe as a noble, semi-civilized race; statements not born out by facts. Like the Aztecs, they were sun-worshippers and given to bloody sacrifices. They formed two classes, the Blood Royal, and common people, or Stinkards. French oppression caused them to revolt, in 1729, and in the following year they were nearly destroyed. The remainder joined the Creeks and other tribes.

NATCHEZ, city and county seat of Adams co., Miss., 297 miles from Memphis, and 214 miles from New Orleans, located on the Mississippi River, and served by the Louisiana and Arkansas, Mississippi Central, Natchez and Southern, Yazoo and Mississipppi Valley, and the St. Louis, Iron Mountain and Southern railroads. Its steamer connection with Mississippi River ports and its excellent railroad facilities make it an important commercial and industrial center. It is in the heart of a rich cotton, agricultural and stock-raising district, and is the natural market and shipping center for those products. Its chief manufacturing establishments are cotton, oil and planing mills, box, broom and furniture factories, machine shops, foundries and packing plants. The city is the site of Jefferson Military College, Natchez Institute, Natchez College and has an excellent public and parish school system. There are two libraries, numerous churches, four banks, and two newspapers. The waterworks are municipally-owned and operated. The government is vested in a mayor and a council. The city was the scene of important military operations during the Civil War. Pop., 1920, 12,608.

NATHAN, GEORGE JEAN (1882), an American editor, author and critic; *b.* at Fort Wayne, Ind.; *s.* of Charles and Ella Nathan. He was educated at Cornell, and at the University of Bologna, Italy. He was on the editorial staff of the *New York Herald* during 1905-06, after which he was a dramatic critic and a writer on the theatre for various magazines and periodicals, including the *Associated Sunday Magazines*, from 1909-14, and them became editor (with H. L. Mencken) of the *Smart Set Magazine*, of which he had been a dramatic critic from 1908. He contributed to leading American and Continental magazines, and was the author of several books, among which are: *The Theatre, the Drama, the Girls, 1921*; and *The Critic and the Drama, 1922.*

NATICK, town in Middlesex co., Mass., on the Charles River, and served by the Boston and Albany Railroad. It was founded by John Eliot, the great apostle to the Indians, in 1651, but was not incorporated as a town until 1781. Its chief industries are the manufacturing of shirts, boots and shoes, clothing, tools, baseballs, and athletic supplies. It is the seat of Morse Institute, and has excellent schools, a high school of women, numerous churches, a public library, two banks, and three newspapers. Cochituate Lake, in the N.W. part of the town, is one of the sources of Boston's water supply. Pop., 1920, 10,907.

NATIONAL ACADEMY OF DESIGN. See ACADEMY OF DESIGN, NATIONAL.

NATIONAL ACADEMY OF SCIENCES, a body whose membership is composed of the leading scientists of the United States, election to membership being considered a mark of distinction. The avowed purpose of the association is to promote research in all the fields of scientific interest and to report on any such subject when called upon by any department of the Government. It was founded in 1863. The annual meetings also serve as a forum of discussion between the members, discoveries and new

theories being here presented. At the annual meeting held during November 14-16, 1921, such subjects were presented as: 'The Contrasted Types of Earth-Energy and their Relative Values,' by Thomas C. Chamberlain; 'A New Theory of the Carbonization of Coal,' by S. W. Parr; and 'The Influence of Heredity in the Incidence of Cancer,' by Maud Slye. In that same year there were 198 regular members, one honorary members, and 37 foreign associates. The trust funds for the support of the association amount to nearly $250,000. The Academy publishes an Annual Report and its Proceedings, the latter issued in monthly installments. The Secretary's office is at the Smithsonian Institute, Washington, D.C.

NATIONAL ANTHEMS.—The growth of patriotic songs or hymns, which have been specialized as the national tune of various nations, dates from the XVIII. cent. Chief among N. A's is the English *God Save the King* (c. 1745, attributed to John Bull and various other composers from 1620 to 1750). Other famous N.A's include *Hail, Columbia! 1798*; and *The Star-Spangled Banner, 1814* (U.S.A.); the *Marseillaise* (France); *Heil dir im Siegeskranz* (Germany).

NATIONAL ARMY. See ARMY, UNITED STATES.

NATIONAL ASSEMBLY. See FRENCH REVOLUTION.

NATIONAL BANKS. See BANKS, NATIONAL.

NATIONAL CEMETERIES.—Cemeteries instituted and maintained by the Federal Government for interment of soldiers and sailors who have *d.* in the regular, or volunteer service of the United States, or after being mustered out, or honorably discharged. Included are army and navy paymaster clerks and nurses honorably discharged, or pensioned. Presentation of commission warrants, honorable discharge, letter of appointment, or pension certificate, secure interment. Wives of officers and enlisted men may be interred in National Cemeteries according to regulations of the War Department. The National Cemeteries are under charge of the Quartermaster-General War Department, his representative being an officer of the quartermaster corps nearest the cemetery. All National Cemeteries are within the continental limits of the United States, with the exception of one in Mexico. Names and locations as follows:

Alexandria, La.; Alexandria, Va.; Andersonville, Ga.; Andrew Johnson, Greenville, Tenn.; Annapolis, Md.; Antietam, Sharpsburg, Md.; Arlington, Va.; Ball's Bluff, Leesburg, Va.; Varrancas, Fla.; Baton Rouge, La.; Battle Ground, Washington, D.C.; Beaufort, S.C.; Beverly, N.J.; Brownsville, Tex.; Camp Butler, Ill.; Camp Nelson, Ky.; Camp Hill, Louisville, Ky.; Chalmette, La.; Chattanooga, Tenn.; City Point, Va.; Cold Harbor, Va.; Corinth, Miss.; Crain Hill, Indianapolis, Ind.; Culpeper, Va.; Custer Battlefield, Crow Agency, Mont.; Cypress Hills, Brooklyn, N.Y.; Danville, Ky.; Danville, Va.; Fayetteville, Ark.; Finn's Point, Salem, N.J.; Florence, S.C.; Fort Donelson, Dover, Tenn.; Fort Gibson, Okla.; Fort Harrison, Varina Grove, Va.; Fort Leavenworth, Kan.; Fort McPherson, Maxwell, Neb.; Fort Scott, Kan.; Fort Smith, Ark.; Fredericksburg, Va.; Gettysburg, Pa.; Glendale, Va.; Grafton, W.Va.; Hampton, Va.; Jefferson Barracks, Mo.; Jefferson City, Mo.; Keokuk, Ia.; Knoxville, Tenn.; Lebanon, Ky.; Lexington Ky.; Little Rock, Ark.; Loudon Park, Baltimore, Md.; Marietta, Ga.; Memphis, Tenn.; Mexico City, Mex.; Mill Springs, Ky.; Mobile, Ala.; Mound City, Ill.; Nashville, Tenn.; Natchez, Miss.; New Albany, Ind.; Newbern, N.C.; Philadelphia, Pa.; Poplar Grove, Petersburg, Va.; Port Hudson, La.; Quincy, Ill.; Raleigh, N.C.; Richmond, Va.; Rock Island, Ill.; Salisbury, N.C.; San Antonio, Tex.; San Francisco, Cal.; Santa Fe, N.Mex.; Seven Pine, Va.; Shiloh, Pitt's Landing, Tenn.; Soldiers Home, Washington, D.C.; Springfield, Mo.; St. Augustine, Fla.; Staunton, Va.; Stone River, Murfeesboro, Tenn.; Vicksburg, Miss.; Wilmington, N.C.; Winchester, Va.; Woodlawn, (Elmira), N.Y.; Yorktown, Pa.

NATIONAL CIVIC FEDERATION, an organization with headquarters in New York City, founded in 1900, which purports to assemble within its membership representatives of capital, labor and the general public, for the purpose of discussing their common interests. As set forth in further detail, it desires to 'organize the best brains of the nation in an educational movement seeking the solution of some of the great problems related to social and industrial progress; to provide for study and discussion of questions of national import; to aid thus in the crystallization of the most enlightened public opinion; and, when desirable, to promote legislation in accordance therewith.' Its active body is the Executive Committee, on which are representatives of the three interests already mentioned, the members of which are divided into special committees for the study or investigation of special subjects. In 1921, one of these committees, known

as the 'Commission of Foreign Inquiry,' made a study of the labor situation in France and England, publishing its report in book form. Other subjects of study during that year were: 'Collective Bargaining,' 'Injunctions in Labor Disputes,' 'Industrial Democracy,' 'Compulsory Arbitrations,' 'Profit-Sharing by American Employers,' 'National Defense,' 'Americanization of Immigrants,' 'Revolutionary Forces in the United States,' and kindred topics. It has a Women's Department, which undertakes, through surveys and experimentation, to arrive at a basis for constructive remedial legislation in matters relating to industrial, social, and economic life, primarily as it affects women and children. The organization is extremely conservative in character. Its most active official is Ralph M. Easley, chairman of the executive council, Samuel Gompers being a vice president. Its official organ is *The National Civic Federation Review.*

NATIONAL CONSERVATION ASSOCIATION. See CONSERVATION.

NATIONAL CONSERVATION CONGRESS. See CONSERVATION.

NATIONAL CONVENTION. See CONVENTION, NATIONAL.

NATIONAL DEBT.—The World War expanded the public debt of the United States from $1,006,281,000, in 1916, the year before the country became a belligerent, or $9.88 per capita, to $22,691,276,000 in 1922, or $206.17 per capita. The pre-war debt was composed chiefly of 2% consols of 1930, 4% loan of 1925, Panama Canal loan, conversion bonds, and postal-savings bonds. The swelling of the debt to its post-war figures was due to issues of certificates of indebtedness, war savings securities, and (chiefly) of the successive Liberty loans (*q.v.*), the last named aggregating, before refunding steps were taken for redeeming the short-term issues, to $19,581,201,450. See DEBTS WAR.

NATIONAL GUARD. See ARMY, UNITED STATES.

NATIONALIZATION OF INDUSTRIES. See BOLSHEVISM.

NATIONAL MONUMENTS, as indicated by an Act of Congress, passed on June 8, 1906: 'an Act for the preservation of American antiquities, historic landmarks, historic or pre-historic structures and other objects of historic or scientific interest situated on lands owned or controlled by the Government of the United States.' The term is used in its widest sense and may refer to a waterfall, a mountain peak, a rock of peculiar formation, untouched by the hand of man; or it may include the adobe ruins of an Indian village, the graveyard of a community of mound-dwellers, etc. National monuments are usually included within national parks. There are about thirty national monuments in the country; these include: the Devil's Tower, in Wyoming; Montezuma's Castle, in Arizona; Chaco Canyon, in New Mexico; the Muir Woods, in California; the Natural Bridges, in Utah; the Lewis and Clark Cavern, in Montana; and the Petrified Forest, in Arizona. Most of these are under the protection of the Department of the Interior, while a few are under the jurisdiction of the War Department and the Department of Agriculture. In 1921, the visitors to the national monuments numbered 164,461.

NATIONAL (OR NAVAL) OBSERVATORY, THE, an institution under the jurisdiction of the U.S. Navy Department, established by an Act of Congress, passed in 1842. For ten years previous, there had been a bureau of naval instruments and charts, whose function it was to correct the chronometers of the Navy vessels and to revise their charts, which was being done in a very inadequate manner, on account of lack of facilities and plant. The Act passed in 1842, carried with it an appropriation of $25,000, with which a regular observatory was established, in which such observations were carried on of the heavenly bodies as were necessary for the accurate adjustment of chronometers, etc. The present observatory now occupies a site of 68 acres, in Washington, D.C. It issues the correct time at noon every day, gives ships within radio distance at sea corrections for their chronometers, and issues all the nautical instruments to the ships of the U.S. Navy. It has one of the finest libraries of books covering its particular field in the world, numbering 30,000 volumes.

NATIONAL PARKS AND RESERVATIONS.—Congress, by Act of August 25, 1916, created a National Park Service which placed the National parks and monuments under the Department of the Interior, in charge of a director. Names nd locations of National Parks, and date of creation: Hot Springs, middle Arkansas, area 112, 1832; Yellowstone, northwestern Wyoming, area 3,348, 1872; Sequoia, middle-eastern California, area 252, 1890; Yosemite, middle-eastern California, area 1,125, 1899; General Grant, middle-eastern California, area 4, 1890; Mount Rainier, west-central Washington, area 324, 1899; Crater Lake, S.W. Oregon, area 249, 1902; Wind Cave, S. Dakota, area 17, 1903; Platt, S. Okla-

homa, area 1 1-8, 1904; Sully's Hill, N. Dakota, area 1 1-8, 1904; Mesa Verde, S.W. Colorado, area 77, 1906; Glacier, N.W. Montana, area 1,534, 1910; Rocky Mountains, north-middle Colorado, area 397 1-2, 1915; Hawaiian Islands, Hawaii, area 118, 1916; Lassen Volcano, N. California, area 129, 1916; Mount McKinley, south-central Alaska, area 2,645, 1917; Grand Canyon, north-central Arizona, area 958, 1919; Lafayette, Maine coast, area 8, 1919; Zion, S.W. Utah, area 12, 1919. There are seven military and other parks at Chickamauga and Chattanooga; Georgia and Tennessee; Shiloh, Tenn.; Gettysburg, Pa.; Vicksburg, Miss.; Antietam Battle Ground, Md.; Lincoln's Birthplace, Ky.; and Guilford Court House, N.C.

NATIONAL SECURITY LEAGUE, an organization formed in 1914, and incorporated in the year following, with headquarters in New York City, for the purpose of combating radicalism. Its stated object is 'to promote patriotism and good citizenship, and to combat socialism, bolshevism, and all forms of radicalism.' It conducts a nation-wide propaganda for Americanism, aimed at the better instruction of all citizens, natives as well as foreign-born, in what its members hold to be American ideals and American forms of government. Its propaganda is not only carried forth through great masses of literature, but by means of public meetings and street-corner gatherings. It is particularly active among school children and prospective applicants for citizenship. Its funds are obtained from membership dues and private contributions.

NATURAL BRIDGES, rock formations constituting arches spanning a valley, canyon, or fissure. Most of them are formed by the action of water. A river is formed in a broad valley and swings around in a bend, nearly completing a circle. That point at which it approaches its own course again is known as the neck. The natural tendency is the gradual wearing away of this neck until there is a break and the river straightens out its course, the former bend becoming a series of stagnant pools. It sometimes happens, however, that at the the neck there may be a strata of rock which checks this natural tendency. Eventually, as the bed of the river deepens, looser formations under the strata are washed out and the river straightens out under the rock. The sweep of the water then deepens the course underneath, leaving the natural arch untouched above, the erosion deepening and widening. The natural bridges of Utah are supposed to have been formed in this manner. The biggest of these has a height of 265 feet, a span of 320 feet, and a roadway 35 feet broad. Other natural bridges may be formed by the water breaking through under the crest of a waterfall, leaving the latter high and dry. The natural bridge of Virginia is of this type, being 236 feet in height, and having a 50-foot span.

NATURAL CEMENT. See CEMENT.

NATURAL GAS.—The name given to the accumulations of inflammable gases existing in natural reservoirs in the earth's crust. These accumulations occur in many parts of the world, and are widely distributed in the U.S.A. They are also found in Canada, England, Germany, Roumania, Russia, Australia, India, Persia, China, and Japan. The quantity of natural gas consumed in the United States, however, represents about 98 per cent of the total for the whole world. The states in which natural gas is used include New York, Pennsylvania, West Virginia, Kentucky, Ohio, Indiana, Kansas, Texas, Louisiana, Colorado, South Dakota, and California. The gas varies considerably in composition, but usually contains a high proportion of methane, or 'marsh gas' (*q.v.*) the percentage varying from 39 per cent to 98 per cent, the higher percentages being more common. Other constituents are ethane, hydrogen, nitrogen, carbon dioxide, and monoxide, hydrogen sulphide, ozygen, and sometimes helium. It is believed to be the product of decomposing vegetable matter, the decay taking place very slowly at a low temperature. The quantities already consumed in the United States are vast, and, in addition, a steady leakage from natural vents frequently occurs, so that the quantity originally present must have been almost inconceiveably great. From one well in Pennsylvania, in 7 1-2 years, 7,781,946,000 cubic feet of gas were obtained. A well which yields 1,000,000 cubic feet per day is considered commercially profitable, but yields of over 30,000,000 cubic feet per day are by no means unknown. Natural gas is used for both industrial and domestic purposes. In the home it is not dangerous to health and for heating purposes it is safer than wood or coal. It is claimed that when used with mantles, it affords the cheapest and best illuminant known. In some parts of the United States, the supply has already become exhausted. The gas fields near Pittsburgh no longer yield a sufficient quantity to make them worth working, the wells in N.W. Ohio are nearly exhausted, and the supplies in New York and Central Indiana are greatly depleted. New wells and gas-fields are

constantly being discovered and opened up, but it is obviously only a matter of a comparatively few years before the available supply of gas has been completely exhausted.

NATURAL HISTORY, a term which originally meant the systematic study of all natural objects, animal, vegetable, and mineral, and thus included all sciences, such as biology, geology, chemistry, etc. With increasing knowledge and the growth of specialization, such a term by its very vagueness became unsuitable in many cases. It is, when now used, practically synonymous with zoology, although by some naturalists it is confined to the study of the living organisms, thus not including comparative anatomy. The name is gradually falling into desuetude, but survives in such titles as The Museum of Natural History.

NATURAL PHILOSOPHY, a term denoting science as a whole, or that branch of it usually called physics at the present day. The philosophy of the ancients included the study of natural phenomena and hypotheses regarding their relations. As knowledge progressed, there was a tendency to subdivide science into various spheres. In the course of differentiation, the term 'natural philosophy' was retained for that branch of science which does not deal with the ultimate structure of substances, but only with such phenomena, as light, heat, sound, etc., which are independent of chemical conceptions. It is no longer possible to maintain such a separation. See PHYSICS, HEAT, LIGHT, SOUND, MAGNETISM, and ELECTRICITY.

NATURAL RESOURCES, PROTECTION OF. See CONSERVATION.

NATURAL SCIENCES, ACADEMY OF. See ACADEMY OF NATURAL SCIENCES.

NATURAL SELECTION. See EVOLUTION.

NATURALIZATION, the transfer of allegiance of a subject or citizen of one country to another. American laws declare that such a step is an inalienable right of all peoples, and that the consent of the governments of the countries of origin is not required. In order to become an American citizen, an alien, at least two years after his admission into the United States, must swear a declaration before a Federal Court, or a State Court of record having a common-law jurisdiction, of his intention to become a citizen, and to renounce forever all fidelity to the government of his native country, or of every other foreign nation. Treaties between the United States and a number of foreign powers (except the one with Great Britain) provide that five years of continuous residence and formal naturalization shall constitute undisputed citizenship. Accordingly, after five years' residence in the United States, within the territory over which the court before which he declared his intention has jurisdiction, he can be admitted to full naturalization if the court is satisfied as to his fitness for citizenship. His naturalization also confers equal citizenship upon his wife and children if the latter are under 21 years of age.

Aliens who have served in the army or navy services for four years are admitted to citizenship without swearing to a declaration of intention. No citizenship papers are issued to any alien who cannot speak the English language, unless he has made homestead entry in public lands. Alien inhabitants of U.S. dependencies, upon becoming residents of the United States, can at once file their declarations and become citizens in two years. No Chinese, Japanese, or persons generally of Asiatic descent that are not white, can be naturalized. A number of states confer the right to vote on aliens before the latter have fulfilled the requirements of Federal naturalization.

Formerly, an alien woman who married an American citizen acquired full naturalization rights by her marriage, but a law that came into operation in September 22, 1922, denied her this privilege and required her to take out citizenship papers on her own account. The same law also protected an American woman from losing her citizenship upon marriage to an alien.

In 1921, 304,481 declarations of intention to become citizens were filed by aliens; 163,656 were admitted to full citizenship, and 18,981 were denied citizenship. The jurisdiction exercised by specified Federal and State Courts in granting citizenship is supervised by the Bureau of Naturalization of the Department of Labor.

NATURE STUDY, a modern revolt against the bookish tendencies of older methods of education. It is encouraged in schools with the object of teaching children to observe for themselves and not to accept common hearsay, with its frequently superstitious associations, as fact. Through it a child may be admirably grounded in the rudiments of most of the natural sciences, so that as he grows older his interests are broadened and his habits of thought and view of life are more scientific. In relation to the modern attempts to repopulate the countryside, N.S. is of the very first importance, especially in the country

schools. The practical application of N.S. in schools by gardening, and by the keeping of small live stock, such as poultry and bees, has lately made rapid progress, and will become a more prominent feature of the elementary educational system as the supply of teachers qualified for the work increases. School gardens have been for some years a prominent feature of the system of elementary education, and the results have been found to be eminently satisfactory.

NAUCRARY, a division of the people of Attica, based, most probably, on the provision of a ship by each. The Ionian tribes were divided into 48 N's.

NAUCRATIS, ruined Gk. town, at Canopic mouth of Nile, Egypt; had pottery factory and various temples; rediscovered by Flinders Petrie, in 1884, and subsequently excavated.

NAUDÉ, GABRIEL (1600-53), Fr. scholar; physician to Louis XIII.; formed Mazarin's library, 1642, and preserved it from destruction during the Fronde; wrote *Advis pour dresser une bibliothèque, Jugment de tout ce qui a eté imprimé contre le Cardina Mazurin, 1649*; etc., all now rare.

NAUGATUCK, town and borough in New Haven co., Conn., 40 miles S.W. of Hartford, 25 miles N.W. of New Haven, located on the Naugatuck River, and served by the New York, New Haven and Hartford Railroad. It was incorporated as a borough in 1893. Its leading industries are rubber goods, knit goods, machine shop products, paper boxes, and chemical products. A very large business is done in the reclamation of old rubber. It has excellent public and parish schools, academies, churches, a public library, two banks, and two newspapers. It is governed by a board of burgesses and wardens, by whom all administrative officials, except those connected with education, are appointed. Pop., 1920, 15,051.

NAUGATUCK RIVER (Connecticut). It rises in the N. part of Litchfield co., and flowing S., enters the Housatonic at Derby. Many factories and mills are located along its borders. The principal town is Waterbury.

NAUHEIM, BAD NAUHEIN (50° 20′ N., 8° 42′ E.), watering-place, Hesse, Germany; salt springs. Pop. 6,000.

NAUMBURG (51° 10′ N., 11° 44′ R.), town, on Saale, Saxony, Prussia· cathedral; woolens. Pop. 27,000.

NAUPACTUS (38° 23′ N., 21° 50′ E.), ancient city, now Lepanto, on N. shore of entrance to Gulf of Corinth or Lepanto; near site of battle of Lepanto.

NAUPLIA (37° 33′ N., 22° 48′ E.), fortified town, capital of Argolis, Greece on Gulf of Nauplia. Pop. 11,000

NAUPLIUS, unsegmented larval form of lower Crustaceans, with three pairs of appendages.

NAUSEA, feeling of inclination to vomit.

NAUTICAL ALMANAC. See ALMANAC.

NAUTILUS, a genus of Cephalopoda, with many-chambered cells. The name is also applied to the shells of different genera of mollusks.

NAUVOO, city in Hancock co., Ill., on the Mississippi River, about 30 miles S. of Burlington, Iowa. It is in the midst of an agricultural and fruit-growing region, and its principal industries up to the time of the passing of the Prohibition Amendment and the enactment of the Volstead law was the manufacture and shipment of wines. The city was founded by the Mormons, in 1840, and within six years thereafter had become a thriving town of 15,000 people with a considerable industrial development. A great Mormon Temple, built about that time, is now in ruins. The place was also the headquarters of the Nauvoo Legion, a Mormon military organization, later transferred to Utah. Following the expulsion of the Mormons, in 1846, the town dwindled greatly in population and importance. It now has several churches, public schools, two banks, and two newspapers. Pop 972.

NAVAJOES, or **NAVAHOES,** are N. American aborigines, forming the most important tribe of the southern division of the Athabascon stock of the N. American Indians. The remnants of the tribe are located in the Navajo reservation, New Mexico and Arizona, and number about 20,000.

NAVAL ACADEMY, UNITED STATES, is situated at Annapolis, Maryland, on the Severn River, and was founded in 1845. The students are known as midshipmen, and are appointed to vacancies by the nomination of the President and Senators and Representatives of Congress, after passing preparatory competitive examinations. The President appoints a number allotted to the District of Columbia and to the United States at large. Presidential appointments of midshipmen usually got to the sons of army and navy officers. Enlisted men of the Navy and Marine Corps and members of the Naval Re

serve Force are also eligible for admission to the Academy. All candidates, except four Filipinos, must be American citizens, must not be less than 16 or more than 20 years of age, and be unmarried. In height, they must not be less than five feet and two or four inches, according to age, or less than 111 pounds in weight. Each successful candidate must deposit $350 to cover the cost of his initial outfit, uniform, and equipment. The course is four years, and the pay of a midshipman is $780 a year. After graduation, a midshipman is commissioned as an ensign in the Navy, or may fill vacancies in the Marine Corps, or on the staff corps of the navy.

The instruction includes discipline, seamanship, ordnance and gunnery, navigation, steam and marine engineering, naval construction, physics, chemistry, mathematics (pure and applied), astronomy, history, tactics, naval hygiene and physiology, modern languages and drawing, besides the regular physical training. The Academy, after reconstruction, between 1898 and 1908, at a cost of $12,000,000, has become the finest and best equipped naval college in the world. The chief buildings are Bancroft Hall (named after the Academy's founder, George Bancroft, Secretary of the Navy), Memorial Hall, Army, Seamanship and Gymnasium Building, Academy Building, Steam Engineering Building, and the Chapel. In 1922, there were 2,248 midshipmen, and a teaching staff of 250, under the direction of Rear-Admiral Henry B. Wilson, who was apopinted Superintendent of the Academy in 1921.

NAVAL GUNS. See COAST ARTILLERY.

NAVAL INSIGNIA, AMERICAN.—The rank and corps insignia of officers of the United States Navy are shown on the epaulettes, shoulder straps, collars and sleeves of the uniforms they wear, according to their grade. The grade insignia of an admiral is four silver stars; vice-admiral, three silver stars; rear-admiral, two silver stars; commodore (retire), one silver star; captain, silver eagle; commander, silver gold leaf; lieutenant-commander, gold oak leaf; lieutenant, two silver bars; lieutenant of the junior grade, one silver bar; ensign, silver foul anchor, but no grade insignia. The shoulder stripes are strips of gold lace, varying in width and number, according to rank. Thus an ensign or junior lieutenant has one or two stripes of 1-4 or 1-2 an inch; lieutenant-commander, 3 stripes, two of 1-2 inch; commander, 3 stripes of 1-2 inch; captain, 4 stripes of same width; commodore (retired), a 2-inch stripe; rear-admiral, a 2-inch and 1-2 inch stripe; vice-admiral, one 2-inch and two 1-2-inch stripes; admiral, one of 2-inch and 3 of 1-2-inch stripes. Line officers have a gold embroidered star on the sleeve above the stripes. Chief boatswain, gunners, and carpenters have a 1-2-inch stripe of gold lace inset with blue silk. Officers' uniforms consist of full dress, undress, evening dress, blue service dress, white service dress, and white mess dress. The enlisted force have uniforms known as blue dress, blue undress, white dress, blue working dress, white working dress, and dungarees. One or more chevrons reveal the grade of petty officers. Third petty officers have one chevron; second class, two; first class, three; chief petty officers, three chevrons with an arch of red cloth above.

NAVAL INSTITUTE, THE UNITED STATES.—Founded at Annapolis, Md., in 1873, for the purpose of publishing naval information. The members are officers of the army and navy, and men connected with the Navy Department. Persons interested in naval questions may be elected associate, or honorary members. Prizes of a life membership, a gold medal, and a sum of money, are offered every year for the best paper, or essay on some subject of value to the naval service. The Institute publishes a quarterly *Proceedings*.

NAVAL MILITIA. See ARMY, UNITED STATES.

NAVAL REDUCTION. See CONFERENCE ON THE LIMITATION OF ARMAMENTS.

NAVAL RESERVE, UNITED STATES.—The Naval Reserve of the United States, created in 1915, was an outgrowth of the Naval Militia (*q.v.*) established and supported by coast and lakes states for harbor defense. The Act adopted by Congress, provided also for a Fleet Naval Reserve. Naval Auxiliary Reserve, Volunteer Naval Reserve, and the Naval Reserve Flying Corps. The Act was amplified by a war measure passed in 1916, creating the National Naval Volunteers to enable the Naval Militia, who could not otherwise be called into service, except to repel invasion, to volunteer for duty abroad in any emergency. By a further Act, passed in 1918, the Naval Reserve and Naval Volunteers, which were separate organizations, became amalgamated. The creation of an extended Naval Reserve proved of unexampled value in the World War. Before the Reserve was established, the State Naval Militia numbered 596 officers and 7,132 men, of varying efficiency. By the close of the War the

enlisted Militia men and Reserves had grown to 335,447—30,358 officers, and 305,089 men, a force that exceeded that of the regular Navy by more than 100,000. At best, however, the Naval Reserve was the fruit of emergency measures and the demobilization that followed the war left it still needing formative legislation for reorganizing it on a permanent and satisfactory footing. The broad basis on which a Reserve could be perpetuated was already laid. The purpose of the Reserve force was to enroll and train in peace time the needful personnel who in time of war or when the President declared a national emergency existed, could be called to the colors and thereafter be used in any capacity for naval service. All citizens who have served in the Navy for four years or more belong to the Reserve.

NAVAL SCHOOLS, AMERICAN.—The training and education of line and staff officers of the Navy embrace courses at the Naval Academy (*q.v.*) at Annapolis, the Naval War College, at Newport, R.I., and post-graduate work at various educational institutions, including Columbia University, Massachusetts Institute of Technology, and George Washington, and Harvard Universities. At New London, Conn., practical training is given in handling submarines and firing torpedoes from them, while at Pensacola, Fla., the Navy Department provides instruction in aviation, both for heavier-than-air and lighter-than-air craft. Naval law courses are taught at the Judge-Advocate-General's Office, and at George Washington University, Washington, D.C., and the required knowledge of ordnance, marine, gas, electrical, and radio engineering, optical and gyroscope instruments, and other branches of naval science at the Naval Academy, naval gun factory, Ford strument works and other industrial plants. For the training and education of enlisted men, there are training stations at Newport, R.I., Hampton, Roads, Va., Great Lakes, Ill., and San Francisco, Cal. Trade schools are maintained at these stations and at several of the navy yards nad naval air stations. The training is supplemented and continued through navy education study courses in technical knowledge for men on active duty in naval vessels and at naval shor stations. These technical courses, which cover a wide range, are closely allied to naval duties, and embrace instruction in fundamental subjects with which enlisted men are frequently not sufficiently acquainted for a proper understanding of the courses related to those duties. Naval education is conducted through the Board of Navigation of the Navy Department.

NAVARINO, BATTLE OF, naval battle, 1827, which secured independence of Greece, Brit., Fr., and Russ. fleets, under Sir Edward Codrington, engaged against Turk. and Egyptian fleets to almost total destruction of latter; results: Turks. obliged to abandon Greece; Turk. power fatally weakened.

NAVARRE, NAVARRA (42° 40′ N., 1° 50′ W.), province, Spain; bounded by France, Aragon, Castile, Alava, and Guipuzcoa; area, 4,055 sq. miles; traversed by Pyrenees; chief rivers, Ebro, Arga, Ega, Aragon; capital, Pamplona. N. was an independent kingdom, X. cent.; joined to Aragon, 1076; Champagne, 1234; Spain, 1512; Fr. Navarre (part of Basses-Pyrènèes) passed to France with Henry IV. (Henry of Navarre), 1589. Chief products, grain, olives, fruits, red wine; cattle-rearing; silver-lead and copper mines; iron-ore and salt found. Pop., 1920, 316,144.

NAVARRETE, MARTIN FERNANDEZ DE (1765-1844), Span. historian; wrote on discovery of America; author of *Life of Cervantes.*

NAVE, that part between the side aisles of a cathedral or church, extending from western entrance to transept, on to choir or chancel, according to nature and extent of the building.

NAVEL, UMBILICUS, the depression on the front of the abdomen marking the point of attachment of the umbilical cord, by which the *fœtus* obtains nourishment from the mother.

NAVIGATION, the art of directing a ship along any desired course, and of accurately determining its position at any time. The actual management of a vessel comes under *seamanship* (*q.v.* under SHIPS). In the early days of ships, mariners were mostly obliged to keep within sight of land, for otherwise, their only guides were the sun and the stars, which could only avail them in clear weather. In Eastern waters, such as the Indian Ocean and the China Sea, the monsoons provided a means of guidance, their constant uniformity of direction enabling vessels running directly before them to keep a steady course.

The application of the magnetic compass to navigation opened up a new era. Given a chart to indicate the relative positions of places, the navigator could now direct his course. But a chart would be comparatively useless without some means of ascertaining exactly the position of the ship at any moment. On a spherical body the position of any point

determined by two co-ordinates, and
n the surface of the earth these co-
rdinates are called meridians and para-
els. The *meridians* are circles passing
rough the poles, and the *parallels* are
rcles parallel to the equator, and each
eridian intersects each parallel. The
ngular distance of any meridian from a
xed medidian gives the longitude of all
oints upon it, the parallels similarly giv-
g the latitude, and if the latitude and
ngitude of any point are known the
osition of that point is definitely fixed.
he navigator therefore requires a
ethod of determining these co-ordi-
ates, in order that he may direct his
ourse by chart and compass.

In whichever hemisphere an observer
ay be, the *latitude* equals the altitude of
ne celestial pole above the horizon. If
ne distance of any celectial body from
ne pole is known, the meridian altitude
f that body gives, by a simple calcula-
on, the latitude. The altitudes are
aken by means of the *sextant*, and the
equired polar distances are given in the
Nautical Almanac. In the northern
emisphere the Pole star is very close to
ne pole, and an observation of it gives
om a table in the *Nautical Almanac* the
titude of the pole itself, and hence the
equired latitude. The *longitude* is de-
rmined by comparison of the local time
ith the corresponding Greenwich time.
t sea, the observatory method of ascer-
ining local time, by noting the exact
oment when some known celestial body
osses the meridian, is impracticable,
nd the local time must be obtaind by
alculation. The altitude of a known
elestial body is taken when that body
out of the meridian, and from the
ready determined latitude the greatest
titude of the body is calculated.

Dead reckoning is the calculation of the
ip's position without recourse to astro-
omical observations. The principal
ata are the latitude and longitude of the
lace of departure, or, at last determined,
ne course followed, the rate of sailing,
nd the time which has elapsed. Owing
o its great liability to serious errors due
o various causes dead reckoning is not
o be depended upon unless frequently
ecked by astronomical observations,
nd it is chiefly used when weather con-
tions make such observations impos-
ble.

NAVY AND NAVAL POWER.—From
ne earliest historical times it has been
cognized that a state which possesses
ny seaboard must have, in addition to
n adequate land force, a fleet to protect
s commerce and its colonies, to defend
s coasts, and, should occasion arise, to
rry war into hostile waters. As early
vilization centered round the Mediter-
ranean, it is to that part of the world that one looks for the beginnings of sea-power.

Sea - power. — The Phœnicians were probably the first rulers of the E. Meriterranean, and by their enterprise and maritime skill they dominated commerce in the Levant and established cities and trading posts in Sicily and along the African coast as far as the Pillars of Hercules (Gibraltar). Meanwhile the Gr. states were increasing their mercantile marine and also planting colonies in Asia Minor, Magna Græcia, and Sicily, where they came into conflict with the Phænicians, who, together with the Etruscans, a nation which possessed a considerable fleet, drove back, in 537 B.C., a flotilla of Phocæan Greeks who were attempting to establish themselves in Corsica.

The rise of Persia reduced Phænicia to a tributary state, and the 'Great King' frequently employed Phænician ships in his military enterprises. Thus, when Xerxes planned his invasion of Greece, he collected an enormous fleet, largely composed of Phænician and Ionian vessels. The victory of Salamis, 480 B.C., won for Greece (and particularly for Athens) not only freedom from Persia, but also the suzerainty of the E. and Central Mediterranean, while Phænicia as a great factor in naval warfare did not reappear till mediæval times.

The downfall of Athens as a sea-power was due to the mismanagement of the ill-starred Syracusan expedition, 415-413 B.C., when the flower of the Athenian navy perished. The marvellous recuperative power which enabled her to conduct the subsequent Peloponnesian War was but a last effort, and upon the appearance of a fleet superior both in *moral* and tactics, Athens was finally crushed at Ægospotami, 405 B.C. Her victors were too short-sighted to make much use of their triumphs.

Although Phænicia's power had declined, her colony, Carthage, was in the W. and Central Mediterranean what Phænicia had been in the Levant. Rome was excluded from maritime commerce, and her development was consequently hindered. She had no fleet to defeat her rivals, but with characteristic enterprise set about building one. Her naval tactics were original: by the *corvus* she succeeded in turning a naval engagement into something approaching a land battle. The Punic Wars were won, not on land—Rome could produce no general equal to Hannibal—but by sea, for the Roman fleet could intercept reinforcements and supplies, and eventually was able to land troops on Carthaginian soil. From this period dates Rome's colonial expansion, due to her sea-power.

Mediæval Period.—On the decline of the Roman Empire the next power on the Mediterranean was Mohammedan. The Saracens drew largely on the Phœnicians for their fleet, and twice subjected Constantinople to serious attacks, 668-716. Their retiral and the change of cap. from Damascus to Bagdad again left Greece a naval power, which proved of great value during the Crusades when combined with fleets from Ital. cities.

During the later part of the X. cent., three powers appeared which were almost exclusively maritime—Venice, Genoa, and Pisa. They were constantly at war with each other till in the XV. cent. Venice was acknowledged victor, and as such remained till after the fall of Constantinople, 1453, when the Turks began to threaten her. The decay of the Venetian sea-power dates from her defeat, in 1470, by the Turks, who till their defeat at Lepanto, 1571, seriously menaced Europe, while the Barbary corsairs constantly inflicted losses upon shipping till a much later date.

Modern Times.—The discovery of the compass and the introduction of gunpowder revolutionized naval warfare; above all, they did away with the galley. The tactics which had existed since class. times were no longer possible under these new conditions, while by the compass longer voyages were rendered possible. To this period belong the rise of Portugal, the exploits of Prince Henry the Navigator, the discovery of the New World, and the growth of Spanish naval power.

England had before this time utilized naval force to a certain extent, as may be seen from her frequent inroads on France and the battles of Sluys and Dover, but it was in the XVI. cent. that her sea-power developed to an astonishing degree. The exploits of Hawkins, Drake, and others on the Span. Main were a fitting prelude to the defeat of the Armada, in 1588, when England, crushing Spain's fleet, took her place as the first sea-power in Europe. The almost inevitable tendency to presume on this new strength led to the mismanaged expedition to the Ile de Ré, 1627, and other failures, while the Dutch for a time seriously disputed the Eng. sovereignty of the seas, and more than once defeated Eng. admirals and inflicted great havoc on Eng. merchant shipping (see under HOLLAND).

During the Seven Years' War, Britain increased her territory at the expense of France, because the latter's fleet was not sufficiently developed; but, again presuming upon her prestige, Britain was worsted at sea in the Amer. War of Independence, and this, even more than the land disasters, lost for her mos of her Amer. possessions.

In the wars with France which termi nated in Waterloo, the Brit. navy showe unquestionably its superiority in *mora* and in its admirals, though in organiza tion it was admittedly inferior. Th wider experience of the Brit. commander was one of the chief factors in the defeat of the French. Indeed, experience is on of the most potent forces in naval war fare, as was admirably shown in th Crimean War, 1854-6. Since the death of Peter the Great, Russia's navy ha become disorganized and had but littl work to do—hence it did not even at tempt to engage her enemies' fleets which were enabled to secure adequat communication for their land force.

Japan as a sea-power came into promi nence with the Chinese War, 1894-5, an her navy secured her ultimate victory The series of defeats inflicted on the Rus sian fleet by Jap. commanders in th Russo-Jap. War, 1904-5, culminating i the great Jap. victory of Tsushima, wo for Japan her place as one of the Grea Powers.

By its superior navy the U.S. were abl to strip Spain of Cuba and the Philip pines, 1898, and the Span. fleet was de stroyed.

German Expansion.—The most strik ing event in the history of sea-power i the early XX. cent. was Germany's sud den rise to second place among the navie of the world. In 1898, the Ger. fleet con sisted of 9 battleships (excluding coast defense vessels), 3 large cruisers, 28 smal cruisers, 113 torpedo boats, and 25,00 men, maintained at an annual cost o $30,000,000. The Navy Act, of 1900 amended in subsequent years, laid dow a regular building programme for a perio of years on so extensive a scale that, i 1920, the Ger. fleet was to comprise a least 41 battleships, 20 large cruisers, 4 small cruisers, 144 torpedo boats, 72 sub marines, and 101,500 men; estimate annual cost, $115,000,000. The number power, and newness of these ships and th systematic policy of 'scrapping' and re placing older and smaller ships by power ful modern vessels, and of maintainin about four-fifths of the entire navy in fu permanent commission (*i.e.*, instantl and constantly ready for war) in Germa home waters—all these development had a most important bearing on Brit naval affairs. Britain was forced to with draw many ships from distant station and concentrate her fleet in home waters Even the Mediterranean had in som measure, 1912, to be entrusted to th friendly care of France; and whereas, i 1900, 'the Brit. navy and Brit. flag wer predominant in every ocean of the worl and along the shores of every continent

1 1914, they were predominant nowhere xcept in the North Sea.' Disarmament vertures of the Brit. Government meet- ng with no response, great additions to ne Brit. navy were rendered necessary to naintain the *Two-power Standard*, long egarded as essential to Brit. naval su- remacy and security. This standard as been subject to various interpreta- ions, but generally demands that Britain nould possess at least two ships for every ne possessed by any combination of two owers that might possibly be arrayed gainst it, there being a kind of tacit un- erstanding that the U.S. Navy did not ount in this policy. Germany's extra- rdinary expansion as a naval power led 1 1912, to a modification of this stand- rd, by which Britain set herself to main- ain a 60 per cent margin over the Ger. eet—*i.e.*, 16 Brit. battleships to every 0 Ger. battleships. This proportion ermany, in 1913, gave indications of ccepting.

Meanwhile, the Brit. overseas Domin- ns had awakened to the necessity of naring the burden of imperial naval efence, and other nations had also en- aged in the naval armament race. The nternational situation was complicated y large increases in the naval pro- rammes of Austria and Italy, the two owers which, with Germany, formed the riple Alliance. At the same time France ndertook a reorganization of her navy, hich, owing to various causes—politi- al, administrative, and a series of disas- ous accidents—had fallen sadly from ne proud position of second naval power hich she held till the end of the XIX. nt.; while the other member of the riple Entente, Russia, began to build up new navy to replace that destroyed in ne war with Japan.

Japan, again, proceeded to enhance her aval prestige by still further improving ne navy she had so rapidly and so fficiently equipped; while by the Anglo- panese Agreement of 1902, Britain was a large extent able to leave to her ally e guarding of Far Eastern waters. In e U.S., Jap. naval development was atched with keener interest than Europ- n expansion; and although the Amer. uilding programme was small in com- rison with certain other powers, the S. Navy was a very formidable factor naval affairs, and only Germany's ex- aordinary spirit had robbed it of the cond place which for a time it held mong naval powers at the beginning of e XX. cent.

Expenditure.—Some idea of the scale d cost of the naval rivalry which arked the *Dreadnaught* era may be thered from the naval expenditure of e leading powers of Europe and the U.S. for 1900-1 and 1913-14 respect- ively.

	1900-1	1913-14
Britain,	£29,998,529	£48,333,194
U.S.,	13,385,574	31,123,740
Germany,	7,648,781	22,887,870
France,	12,511,053	18,626,755
Russia,	8,662,801	24,477,487
Italy,	4,903,129	10,269,460
Austria,	1,821,284	5,985,715

See NAVY, UNITED STATES, CONFERENCE ON THE LIMITATION OF ARMAMENTS; WORLD WAR.

NAVY, AMERICAN.—The Revolutionary War created the navy of the United States, though the fighting ships the young republic then mustered (not a few of them prizes of war captured from the British) served only as a temporary force to meet the necessities of the situation. With independence won, the Navy was practically disbanded and the men discharged. Its strongest feature was its fleet of privateer auxiliaries, numbering 792, while the Navy itself had 64 vessels. Continued depredations on American sea commerce by the Barbary pirates brought a re-establishment of the Navy with the building of a number of frigates, in 1794. Trouble with France over the conduct of her cruisers on the American coast, in 1798, caused the new navy to be further augmented, the leading craft, including the *Constitution* (44 guns, 1,607 tons) and the *Boston* (36 guns, 1,278 tons). The war with France was brief, and with its close the Navy again decayed. The Barbary states, to whose piratical exactions for protection Congress had timorously submitted by reason of naval weakness, made more raids on American commerce, with the result that, in 1801, the Government recognized the necessity of developing sufficient sea-power to cope with such marauding nations. A rejuvenated fleet came into being and was put to effective service in the Four Years' War it waged with the Tripolitan corsairs.

With Tripoli subdued and her blackmail on sea commerce ended for the time being, the Navy once more fell into neglect, to be revived with the War of 1812. The Navy's condition made the United States hesitate for several years before declaring war on Great Britain, for her forcible impressment of Americans from American ships for her war service, but British violations of international law duly reached a stage that forced such a step. The existing Navy consisted of 9 frigates, 8 smaller vessels, and a number of useless gunboats, aggregating in all 15,300 tons, and carrying 442 guns and 5,025 men. It was urged that, in view of the British naval strength

of 1,060 ships, as against the American 17, the Navy should be laid up in dock to escape capture. Thanks to Decatur, and other naval officers, the Navy took a distinguished part in the war despite its handicap. The President and Congress hastily ordered four ships of the line and six 44-gun frigates, but the war was over before these vessels were completed. The Navy, which was strengthened by war prizes, was immediately thereafter called upon to administer further punishment to the Barbary States, which had renewed their depredations, and two squadrons, one under Bainbridge, the other under Decatur, taught Algeria, Tunis, and Tripoli such a lesson that their corsairs thereafter respected American shipping.

The Navy's work thenceforward, and to the Civil War, included putting down piracy in the West Indies, exploring the Pacific, taking possession of California and Mexican coast towns in the war with Mexico, surveying the Isthmus of Panama, capturing the barrier forts of Canton, China, 1856, and sailing up the Parana River to force Paraguay to recognize American rights. The Civil War produced effective naval blockades of Confederate areas with the consequent command of the sea by the Union vessels; the opening of the Mississippi, by Farragut; the battle of Mobile Bay; Confederate torpedo attacks on Federal frigates; the Monitor's (*q.v.*) fight with the Merrimac; the *Kearsarge-Alabama* fight and the *Alabama's* destruction. The Navy had been subjected to the customary reduction, and, when the war came, of 90 vessels on the list, 42 were in commission and the rest unserviceable. Screw steam war vessels had become fully developed, and the fighting power of naval craft expanded to one hundred and more guns. In the course of the war, 208 additional vessels were built, and 418 purchased. The Union Navy captured or destroyed 1,504 Confederate or British vessels.

After the Civil War, the Navy almost sank into obscurity, so much did it suffer from the reaction of the conflict. Few of the prizes were of permanent value, nor were there many effective ships left after the light craft had been sold. By 1881, when Congress provided for four small cruisers, the United States ranked among the weakest of naval powers. From 1869, to the beginning of 1882, the Navy was like a foundling left upon the doorsteps of the indifferent secretaries charged with its care. The country had practically no Navy.

With the appointment of William C. Whitney as Secretary, in 1885, came the foundation of the modern Navy. The old ships were wooden, light and inadequate, and the Civil War, with its crude experimental ironclads, had doomed wooden war fleets to oblivion. Under Chandler, the previous secretary, the nucleus of better war craft had been provided by the building of the first steel or iron ships for the Navy, namely, the *Chicago*, *Atlanta*, and *Dolphin*, made in American yards not too well equipped for modern needs. Whitney's plans embraced invitations to foreign bidders, the result being the battleship *Texas*, designed by an English naval architect, and the cruiser *Baltimore*, designed by Sir William White, who was later chief naval constructor of the British Navy.

Thereafter, the Navy rapidly improved through much needed appropriations, and when the Spanish-American War (*q.v.*) came, in 1898, the United States had a serviceable fleet, built in modernized American yards, whose achievements are recorded in the history of that war. Congress became more liberal, and by 1905, 20 first-class battleships, and 13 large cruisers had been ordered. In subsequent years the battleships were increased only by one or two annually, so that the United States, which had become the second naval power following the Spanish-American War, fell to third place, in 1910, and to fourth place, in 1915.

Just before the entry of the United States in the World War, the American Navy consisted of 12 dreadnought battleships of 307,450 tons (with 5 building); 21 pre-dreadnought battleships of 297,916 tons; 4 coast-defense vessels of 14,900 tons; 10 armored cruisers of 140,080 tons; 14 cruisers (all unarmored warships of more than 1,500 tons are classed as cruisers) of 66,410 tons; 54 torpedo boat destroyers of 45,877 tons (9 building); and 44 submarines (31 building). The total tonnage amounted to 870,453. The war brought a great increase of tonnage, including much new construction from battleships to submarines and submarine chasers and the requisition of numerous private craft as well as passenger liners for transport purposes, producing a temporary strength approaching 2,000,000 tons. Among the additions were three superdreadnoughts, the largest afloat, completed in 1917 and 1918, and more than 100 destroyers. In 1919, three superdreadnoughts of 42,000 tons each, the *Colorado*, *Washington*, and *West Virginia*, carrying 16-inch guns, went under construction following the completion of two similar battleships. The building programme of that year also included 5 battle cruisers and a fleet of fast scout cruisers. Battleships are either pre-dreadnoughts (usually not over 16,000 tons); or dreadnoughts (18,000 tons or

so); or superdreadnoughts (25,000 tons or more). The dreadnoughts have a main battery of all big guns (11 inches or more). The superdreadnoughts have more than 10 big guns in the main battery, or a very large displacement, and a speed of 21 to 25 knots an hour. Battle cruisers are armored cruisers having guns of largest caliber in the main battery and capable of taking their place in line of battle with battleships. They have an increase of speed at the expense of carrying power, fewer guns in main battery, and a decrease in armor protection.

Prior to the Conference, the naval strength of the United States amounted to 779,173 tons, compared with that of Great Britain (1,588,442 tons), and of Japan (340,596 tons). The tonnage under construction aggregated: United States, 842,109 tons; Great Britain, 76,890 tons; and Japan, 328,460 tons; and had not the three nations agreed to limit their navies at the Arms Conference, their comparative relation after the new construction was built would have been: Great Britain, 1,665,332 tons; United States, 1,621,282 tons; Japan, 669,456. As it was, the Three-Power Agreement, which restricted the building of capital ships for ten years, and fixed the ratio of naval strength of the three leading powers at 5-5-3 (that is, the United States and Great Britain of equal strength and Japan second), not only entailed a wholesale reduction of new construction, but the scrapping of many ships, both in commission and building. The United States was allotted 18 capital ships with a tonnage of 515,850, while Great Britain's tonnage was cut to 582,050, and Japan's to 313,000.

Twenty or more American warships were recommended to be scrapped by the naval board appointed to formulate plans for bringing the navy down to the strength agreed upon. Among them was the old *Iowa*, sunk in target practice off Panama, 1923. Others were the *Maine* and *Missouri*, disposed of by sale. The list included the *Washington* (a new superdreadnought), the *Virginia*, *New Jersey*, *Rhode Island*, *Georgia*, *Nebraska*, *Connecticut*, *Louisiana*, *Vermont*, *Minnesota*, *Kanasa*, *New Hampshire*, *Michigan*, *South Carolina*, the *Delaware* or *North Dakota*, and the *Kentucky* and *Ohio*. The vessels the United States could retain under the agreemet, were the *Maryland*, *California*, *Tennessee*, *Idaho*, *New Mexico*, *Mississippi*, all of 32,000 tons; the *Arizona* and *Pennsylvania* of 31,000 tons; the *Oklahoma*, *Nevada*, *New York* and *Texas* of 27,000 tons; *Wyoming* of 27,000 tons; the *Florida* and *Utah* of 21,825 tons; two vessels under construction of the *West Virginia* class, and the *South Dakota*, of 43,200 tons. The reduced Navy, with its total displacement of 525,850 tons, carried 192 heavy guns with a broadside energy in foot-tons of 13,385,176. In May, 1923, five of the discarded battleships were in process of dismantling and eight remained to be scrapped.

Congress was zealous in adjusting appropriations to the curtailed fleet. For 1922-23 the Navy was allowed only $259,450,000. This contrasts with the naval expenditures of the war and post-war period, namely, 1917-18, $1,214,995,767; 1918-19, $1,915,155,835; 1919-20, $1,078,099,485; and 1921-22, $425,848,079. The enlisted personnel was also cut to 86,000 men. By contrast, the highest point in numbers reached by the Navy during the war was 10,590 officers and 215,672 men, or a total of 226,262, to which must be added the naval militia and reserves, which numbered 335,447 officers and men.

The Arms Conference did not limit the building of light craft under 10,000 tons. Among such unrestricted vessels the United States, in 1923, had building 10 first-line cruisers of same tonnage; 3 first-line destroyers of 3,645 tons; and 39 submarines of 37,936 tons. A British White Paper issued in May, 1923, reported that in light craft, exclusive of aircraft and light cruisers, the United States expanded its submarine fleet considerably after the Arms Conference. See CONFERENCE ON THE LIMITATION OF ARMAMENTS.

NAVY DEPARTMENT, UNITED STATES, a department whose head is a member of the President's Cabinet, created by Act of Congress, in April, 1798, previous to which the administration of naval affairs had been under the jurisdiction of the War Department. The Secretary of the Navy is appointed by the President from civil life, with the approval of the Senate. The Assistant-Secretary is also appointed by the President, and has charge of the docks, navy yards and marine corps. Since 1880, a Judge-Advocate has been added as an official of the Department, his function being to review court-martial proceedings, etc. There is also a General Board of the Admiral and 13 other officers, which supervises construction and operation. In 1862, eight bureaus were created as part of the machinery of administration, the heads of which are naval officers appointed by the President. These are the bureaus of Naval Operations; Yards and Docks; Navigation; Ordnance; Construction and Repair; Steam Engineering; Supplies and Accounts; and Medicine and Surgery. There is also an Office of Naval Intelligence, in which six naval officers and a

marine officer prepare publicity material regarding naval affairs at home and abroad. In 1923, the Secretary was Edwin Denby, of Michigan, the Assistant Secretary being Col. Theodore Roosevelt.

NAVY LEAGUE OF THE UNITED STATES, an organization formed, in 1902, with headquarters in Washington, D.C. Its object is to develop in the people a realization of the need of a greater Navy, in pursuit of which it publishes a great deal of literature, emphasizing that need. It has a membership of about 10,000. Its official organ is the *Navy League Journal.* It was originally patterned after similar organizations in France, Germany and England, the membership in the two latter countries being in the neighborhood of a million before the World War, while in France an ex-President of the Republic was its chief official.

NAVY YARDS AND NAVY STATIONS, the first being establishments for the repair and equipping of U.S. Naval vessels, the latter being protected coaling stations, their object being to render ships of the U.S. Navy independent of other sources of coal supply, especially in foreign countries. In early days of wooden sailing ships, the navy yards were also the ship-building yards of the navy, but since then warships are built by private firms. At the present time they are provided with drydocks large enough for the largest battleships, in which their bottoms may be scraped and other repairs carried on, and here, too, ordnance and munitions are stored to be served out to the ships as they are needed. The navy yards are located at Mare Island, Cal.; Brooklyn, N.Y.; Norfolk, Va.; Kittery, Me.; Charlestown, Mass.; League Island, near Philadelphia, Pa.; Washington, D.C.; Puget Sound; and Pensacola, Fla. The naval stations are located at Boston, Mass.; Newport, R.I.; Indian Head, Md.; Norfolk, Va.; Key West, Fla.; New Orleans, La.; Bremerton, Wash.; Port Royal, S.C.; Portsmouth, N.H.; Philadelphia, Pa.; Cavite, in Manila Bay, P.I.; San Juan, Porto Rico; Tutuila, Samoa; Guam, the Ladrone Islands; Guantanamo, Cuba; Pearl Harbor, Hawaii; Sitka, Alaska; and Yokohoma, Japan.

NAWABGANJ (1) (26° 55′ N., 81° 14′ E.), town Bara Banki, United Provinces, India; exports sugar, cotton. Pop., 7,500. (2) town, Rajshahi Division, Bengal, India. Pop., 17,000.

NAWANAGAR (22° 26′ N., 70° 16′ E.), native state, Kathiawar, Bombay, India; capital, N.; silk and gold embroidery. Pop., 340,000; town, 53,000.

NAXOS (1) (37° 5′ N., 25° 30′ E.), island, Grecian Archipelago; largest of the Cyclades; wine, fruits. Pop., 2,000. (2) (37° 3′ N., 25° 25′ E.), ancient seaport, Sicily; earliest Gk. colony in the island; destroyed by Dionysius, 403 B. C.

NAYAGARH (20° N., 85° E.), native state, Bihar and Orissa, India. Pop., 145,000.

NAZARETH (32° 42′ N., 35° 20′ E.), town, Galilee; in ancient times residence of Joseph and Mary. Pop., 9,000.

NAZARITES, NAZIRITES, Old Testament ascetics, who abstained from certain things for a time, under vows, *e.g.* Samuel and Samson; unshorn hair was one characteristic.

NAZIMOVA, ALLA (1879), a Russian actress; *b.* at Yalta, Crimes, Russia; *dau.* of Jacob and Sofia Nazimova. After studying music at St. Petersburg Conservatory, at Odessa, and dramatic art at Philaem Society, at Moscow, she began as a leading woman in Kostroma, Russia, and later appeared at St. Petersburg in prominent roles in stock companies. She made her debut in New York in 1905 as Lia, (in Russian language) in "*The Chosen People*" then, after studying the English language played leading parts in numerous successes until 1916 after which she acted for motion pictures. She married Charles Bryant.

NEAL, JOHN (1793-1876), American author; *b.* in Portland, Maine, August 25, 1793; died there June 21, 1876. He had little schooling and in 1816 moved to Baltimore, where he practiced law and wrote fiction. He lived in England 1823-1827; was for some time secretary to Bentham and wrote for British periodicals. In 1838 he wrote in favor womans suffrage. He befriended Edgar Allen Poe. Among his productions was a long poem "*The Battle of Niagara*" signed "Jehu Cataract." His novels, long forgotten include *Randolph, 1823*; *Brother Jonathan, 1825*; *Rachel Dyer, 1828.* He was the author of the largest part of Paul Allen's *American Revolution.* See his *Wandering Recollections of a Somewhat Busy Life, 1868.*

NEANDER, JOHANN AUGUST WILHELM (1789-1850), Ger. ecclesiastical historian; of Jewish origin; called before baptism, 1806, **DAVID MENDEL**) prof. of Ecclesiastical History at Heidelberg, 1812, at Berlin, 1813; pub. numerous widely read theological books, but great work, *Allgemeine Geschichte der christlichen Religion und Kirche,* was not finished.

NEANDERTHAL (51° 15′ N., 7° E.), Rhine province, Prussia; prehistoric skeleton discovered, 1856.

NEANDERTHAL MAN, a very low type of European, long extinct, represented by a skeleton found in 1856 in the Neanderthal, near Düsseldorf. The skull is very thick and unusually large, is dolichocephalic, with a cephalic index of 72 mm., and is remarkable for its low forehead, its enormous superciliary ridges and an exceptional projection of the occipital region. Skulls presenting almost identical characteristics have been found at Spy, (Belgium), Cannstatt, (Württemberg), Egisheim, (Alsace), Tilbury, Gibraltar, and Heidelberg, 1909. De Mortillet (*Formation de la Nation Francaise, 1897*) concludes that Neanderthal man walked with a slouching gait.

NEAK TRIBES. See TRIBES.

NEATH (51° 39′ N., 3° 48′ W.), port, Glamorganshire, Wales; has copper, tinplate, engineering, chemical and iron-founding works; site of ruined abbey and castle. Pop., 1921, 32,514.

NEBO, NABU ('The Proclaimer'), a Babylonian deity inferior in power only to Marduk, his reputed father; essentially a god of wisdom, the inventor of writing and protector of astrology; his wife was Tashmit, but she had no independent attributes or worship.

NEBRASKA, N. central state of U. S. (41° 30′ N., 100° W.), bounded N. by South Dakota, N. W. by Wyoming, S. W. by Colorado, S. by Kansas, E. by Iowa. Surface is generally undulating, and consists chiefly of extensive plains. Mountains belong to Rocky Mountain system in W.—viz. Wild Cat Mts. (with Hogback Mt., 5,082 ft.; Wild Cat Mt., 5,038 ft.); large stretch of sand-hills in N. central region covering *c.* 20,000 sq. m.; extensive prairies in E. and S.; swamps in S. E. Principal rivers are Missouri (on eastern border), Platte, Republican, Niobrara, Snake, White R., Big Blue; numerous salt and freshwater lakes, springs, and a large supply of ground water. Climate is healthy, with dry fine atmosphere; mean annual temp. *c.* 48° F.; average annual rainfall *c.* 23 in., greatest in E. Fauna includes fox, coyote, black bear, mink, raccoon; numerous birds and insects; great variety of butterflies. Nebraska has been visited by several locust plagues; has immense tracts of grass, but practically no forests.

Nebraska is an important agricultural state; chief products are corn, wheat, oats, hay, potatoes, fruit, sugar-beet, live stock, and wool; chief industries are slaughtering and meat packing, flour milling, printing and publishing, dairying; limestone and sandstone are quarried; large quantities of potash from Alkali Lakes of the state. Irrigation is carried on extensively, also tree planting. Nebraska has many springs, and celebrated saline wells at Lincoln, Beatrice, etc. Total railway mileage, over 8,000.

Nebraska passed to the U. S. as part of *Louisiana Purchase* from French, 1803; constituted a territory, 1854; boundaries fixed, 1861, 1863; admitted as a state, 1867. Nebraska took an active part in the Civil War, 1861-5. Administered by governor, senate (33 members, who are elected for two years), and house of representatives of 100 members; has two senators and six representatives in Congress, and is divided into 92 counties. Principal towns are Omaha, Lincoln (cap.), South Omaha, Grand Island and Hastings. Elementary education is compulsory. Nebraska has several universities, colleges, and other institutions—viz., State Univ. of Nebraska (Lincoln), with medical school at Omaha; Creighton Univ. (Omaha); Cotner Univ. (the Nebraska Christian Univ.), at Bethany, Lincoln; Hastings Coll. (Hastings); Doane Coll. (Crete); York Coll. (York), etc. Area, 77,510 sq. m., of which 702 sq. m. are water. Pop., 1920, 1,279,219. See Map of U. S.

NEBRASKA CITY, city and county seat of Otoe County, Nebraska, 52 miles south of Omaha, located on the Missouri Pacific and the Chicago, Burlington and Quincy railroads. It was incorporated in 1871 and received a city charter in 1891. Its leading industrial establishments are lumber, flour, cereal and planing mills, foundries, machine shops, cigar, starch and pickle factories. Situated in the center of an agricultural and stock-raising region, it has an extensive trade in grain, provisions and packing products. The State Institute for the Blind is located there and it has many handsome State, City and County buildings. There are numerous churches, good public and parish schools, a high school, public library, four banking institutions and three newspapers. The city is governed under the commission plan. Pop., 1920, 6,279.

NEBRASKA, UNIVERSITY OF, a co-educational institution at Lincoln, Nebraska, founded by Act of Legislature in 1869. The first building was opened in 1873 and is now known as University Hall. There are 5 colleges. Graduates School, Science and Arts, Industrial College, including School of Agriculture, School of Mechanical Arts, and School of Domestic Science, College of Medicine, School of Fine Arts, and School of Music.

Degrees are conferred. A farm of 320 acres near the city is directed by the University. Non-resident and professional students pay a small fee. Students, 6,500. Teachers, 658.

NEBRASKA WESLEYAN UNIVERSITY, a co-educational institution located at University Place, four miles from Lincoln. It was founded under the auspices of the Methodist Episcopal Church in 1887. The University includes a College of Liberal Arts, an Academy with courses fitting the college curriculum, Teachers College, School of Expression, and Conservatory of Music. The buildings and grounds are valued at $220,000. Endowment about $300,000. Students, 785. Teachers, 45.

NEBUCHADNEZZAR, or **NEBUCHADREZZAR,** King of the Neo-Babylonian empire; reigned 604-561 B. C. He was the *s.* of Nabopolassar, and during his reign N. defeated Necho at Carchemish. At the beginning of his reign N. had to subdue Jehoiakim, who had rebelled against him. Jehoiakim was succeeded by his son Jeconiah, and N. now besieged and took Jerusalem and took Jeconiah captive to Babylon. After an unsuccessful attempt on Tyre, N. again laid siege to Jerusalem, which submitted after two years. After that he was victorious in Egypt. With him departed the glory of Babylon.

NEBULA (Lat. *nebula,* a cloud), cloudy objects visible in heavens by telescope; many thousands of most diverse shapes, but at least 120,000 are of spiral nature. Some seem merely clouds of gas, but others more condensed. No doubt n. are clouds of gaseous matter contracting into solid bodies, which eventually form stars and systems of stars.

N. are grouped into classes, *Annular,* or ring-shaped, *Elliptical, Irregular, Planetary,* and *Spiral.* As no n. has ever given a parallax, their distance must be enormous. True nature was discovered in 1864, when Huggins studied them by spectroscope.

NEBULAR HYPOTHESIS. Kant suggested that the solar system had been evolved from a huge nebula, which, in process of gradual cooling, had thrown off rings of matter, and that these in time contracted down, forming the planets, and that some of these rings had in their turn thrown off still smaller rings, which formed their satellites. The theory was also held by Laplace, but recent discoveries and researches suggest that the solar system was formed from a small spiral nebula, itself the result of a collision between two bodies.

NEBULIUM. The name given to an element believed to exist in gaseous nebulæ. Its existence is inferred from two characteristic lines occuring in the spectra of these nebulæ. The lines occur in the blue and green and have wave lengths of 5007 and 4950 respectively. These two lines are always found together and always have the same relative intensity. They belong to no element known on earth, and hence are attributed to an element which may have existed on the earth in its early history, but has long since vanished.

NECESSITY, the principle by which the universe, in whole or part, is rendered inevitable.

NECK, the narrow part of the body which unites the head and the trunk. Where a 'neck' is present in invertebrate animals it is altogether indefinite, but in vertebrates it becomes increasingly definite, its character depending chiefly upon the number and shape of the cervical vertebræ, until in all mammals (with four exceptions) a constant number of vertebræ (9) is present. In osteology the neck of a bone is the narrow portion beneath the head.

NECKAR, Rom. **NICKER** (49° 18′ N., 9° 14′ E.), river, Germany, joins Rhine at Mannheim; length, 247 miles.

NECKER, JACQUES (1732-1804), Fr. statesman; established Paris and London banking firm of Thellusson and N.; director-gen. of finances, 1777; introduced important reforms of details; dismissed, 1781; recalled in desperate condition of exchequer, 1788; advised summoning of estates-gen.; again dismissed by king; Estates insisted on recall; failed to provide funds, and resigned, 1790. Mme N., *née* Curchod (1739-94), had a brilliant *salon.*

NECROMANCY, a mode of divination practised by the ancients by which the spirits of the dead were conjured up to answer certain questions about the future. In Homer's *Odyssey,* the shade of Tiresias is brought up and consulted by Ulysses, and the witch of Endor is an example from O. T. history.

NECROPOLIS (Gk. *nekrôs,* and *pôlis,* city of the dead), a cemetery or burying-ground. The name was formerly applied to cemeteries in the vicinity of ancient cities, especially to a suburb of Alexandria, but is now used in a more extended sense for any large burial-ground. Ancient examples remain in Africa (Cyrene and the Egyptian Pyramids), Asia Minor, Greece, and Italy.

NECROSIS, death of part of the tissues, caused most commonly by a bacterial poison or toxin, in an infective condition; term used especially of bone.

NECTAR, the drink of the gods, described by Homer as a red wine which Hebe pours out for the immortals (*Iliad,* XIX. 38, and IV. 3). N., in Greek mythology, had the power of conferring immortality on all who partook of it. The term is applied figuratively to any delicious drink, such as that made from sweet wine and honey.

NECTARINE, variety of **PEACH** (*q.v.*)

NEEDHAM, JAMES GEORGE (1868), naturalist; *b.* in Virginia, Illinois. In 1891 graduated from Knox College. An instructor of biology, from 1894-1896 at Knox College, and professor of biology, 1898-1907, Lake Forest University. Entomologist in charge, 1899-1907 of New York State Entomological Field Station. A member of the editorial board of *Psyche.* Author of: *Elementary Lessons in Zoology, 1895*; *Outdoor Studies, 1898*; *General Biology, 1909*; *Natural History of the Farm, 1913*; *The Life of Inland Waters, 1915,* (with **J. T.** Lloyd).

NEEDHAM, a city in Norfolk co., Mass, manufactures include knit goods. pop. 1920, 7,012.

NEEDLES of steel were first made, 1370. By modern method, wire is cut to double length of needle; eyes made in middle; then filed. N's have been discovered in prehistoric cave-dwellings and Egyptian tombs, of bone or metal.

NEELY, THOMAS BENJAMIN (1841), American bishop; *b.* in Philadelphia, June 12, 1841. Graduated from Simpson College, Iowa, 1884. Ph. D. LL. D. Mount Union College 1890. Ordained to Methodist Episcopal ministry 1893. Pastor of churches in Philadelphia and vicinity for 29 years. Presiding elder 6 years. Elected bishop 1904. Engaged in religious work in Buenos Aires, Argentine, 1904-1908, and opened missions in Panama, and Bolivia. He returned to duty in the United States and Mexico in 1908, and retired in 1912. Author *Young Workers in the Church, 1881*; *South America; a Mission Field, 1906*; *South America; its Missionary Problems, 1908*; *Neely's Parliamentary Practice, 1914*; *American Methodism, 1915*; *The League, the Nation's Danger, 1919*; *Present Perils of Methodism, 1920*; *The Only Condition, 1920,* and other works, also books in Spanish.

NEENAH, city in Winnebago co., Wis., on Lake Winnebago, and on the Fox river, about 90 miles northwest of Milwaukee. It is served by the Chicago Milwaukee and St. Paul, Chicago and Northwestern and Minneapolis, St. Paul and Sault Ste. Marie railroads. It was settled in 1843 and incorporated as a city in 1873. Its main industry is paper manufacturing, but it also has large industrial establishments for shoes, knit goods, cotton waste, fibre rugs, bags, stoves and blank books. It does a large export trade in cheese products. There are many handsome public and private buildings, extensive parks, good public schools, a high school, public library, numerous churches, three banks and two daily newspapers. The waterworks system is municipally-owned. Pop., 1920, 7,171.

NEEMUCH, NIMACH (24° 27′ N., 74° 49′ E.), town, Gwalior, Central India. Pop. 22,000.

NEER, VAN DER, name of two Dutch painters; (1) **AERNOUT** (1603-77), contemporary of Hobbema, excelled in landscape painting, but during his life-time his genius excited no response; (2) **EGLON** (1643-1703), his son, was an eminent portrait painter.

NEERWINDEN (50° 47′ N., 5° 3′ E.), village, in province of Liège, Belgium, not far from Tirlemont; celebrated for battle in 1693, when French under Luxembourg defeated William III., and for victory of Austrians over French under Dumouriez in 1793.

NEGAPATAM (10° 46′ N., 79° 53′ E.), seaport, Tanjore, Madras, India; railway workshops; manufactures oil. Pop., 1921, 60,168.

NEGAUNEE, city in Marquette co., Mich., 12 miles southwest of Marquette and served by the Chicago and Northwestern, Duluth, South Shore and Atlantic and Lake Superior and Ishpeming railroads. It was settled in 1846 and received a city charter in 1873. Several large iron mines are within the city limits and in the immediate vicinity, and it is a large shipping point for iron ore. The electric light plant and waterworks system are owned and operated by the city. There are good public and parish schools, churches, three banking institutions and a newspaper. Pop., 1920, 7,419.

NEGLIGENCE, see under EMPLOYERS' LIABILITY.

NEGROES form one of the four great classes of the human race. In their purest form they are probably found along the Guinea coast, in the Gaboon, the basins of the Shari and Benua, and the lower Zambesi; but the Sudan

is considered the home of the race. It is possible that they peopled Schlater's 'Lemuria,' a continent covering a large portion of the Indian Ocean, and became divided on the subsidence of the region in early and middle Tertiary times. The term is now generally restricted to the western or African branch, those of the eastern region, of S. India, Malay, New Guinea, etc., being Papuans or Malaysians. The former present various mixed types due to Caucasian migration, the latter have been affected mostly by Mongolian movement. The N. characteristics are deep brown, almost black, skin, cool, velvety, and emitting a peculiar odor; short, black woolly hair of elliptical section; short, flat, broad, snub nose with depressed base and dilated nostrils; black eye, black iris, and yellow sclerotic coat; prognathic jaws, facial angle 70°; thick lips, protruding and showing the inner red; high and prominent cheek bones; very thick skull, dolicocephalic (index 70°); cranial capacity, 35 (average European, 45); long arms, weak legs; flat, broad foot with low instep, and 'lark heel'; yellowish palms and soles; height (average 5 ft. 10 in.) above the average. A marked feature is the early closing of the cranial sutures, a premature ossification appearing to prevent a full development of the brain. The children are described as sharp, vivacious, and intelligent, but deterioration commences at puberty, and the full-grown N. remains childlike, unprogressive, lethargic, without initiation. In the arts, *e.g.* building, spinning, weaving, pottery, agriculture, the working of metals, they are moderately advanced, but have probably learnt these under Semitic influence and have certainly shown no development of their own. Their religion was very debased and cruel, fetishism, cannibalism, and slavery being the chief characteristics and outcomes, but they are now largely becoming Mohammedan.

They are childishly gay, and passionate, with childish rapidity in change of mood; thievish, unreliable, indolent, yet with a childish subordination to authority, and marked faithfulness, yet subject to sudden failure. These points of character united to a marked sensuousness render them a serious social problem in the more progressive and civilized lands, particularly in America. Their republic, Haiti, has always had an evil name. The Negroid race is estimated at some 200,000,000. In the United States there are about 10,700,000, forming about one-ninth of the population, and they are more prolific than the whites.

In recent years the Negroes in the United States have made great industrial progress. They have shown themselves capable of carrying on successfully enterprises of great magnitude. In agriculture, business and the professions, great advances have been made, though the percentage of illiteracy is still large, improvement is being made. See NEGRO EDUCATION.

NEGRO EDUCATION. Before the Civil War little was done to educate the negro, and in many slave states the teaching of slaves was a penal offence. It was feared that educated negro leaders might arise who would create discontent among their people and lead them to revolt. Notwithstanding the law many slave owners took an interest in the education of their negroes. In the north negro schools were established before the war. Wilberforce University, Ohio, was founded in 1857 by the Methodist Episcopal Church and became a centre for African Methodism. The American Missionary Society established in 1849, was anti-slavery and built the first school for freedmen at Hampton, Virginia after the close of the war, of which General S. C. Armstrong was long the able and benevolent director. Hampton Institute has been since his day a powerful factor in the education of colored youth. The Freedman's Bureau in 1865 established over 2,000 schools, resigning its educational work in 1870 to the American Missionary Society, together with a large sum of money which was used for the first buildings at Hampton, Nashville, Charleston, and New Orleans. In 1866 the Methodist Church through its Freedman's Aid Society, and the Baptists, Episcopalians, Presbyterians, friends and smaller denominations established hundreds of independent negro schools of a parochial and denominational character. In 1881 the American Missionary Society was under control of the Congregational Church, long active in the work of negro education, and they helped to build and maintain Howard University, Washington, D. C., Hampton Institute, Virginia, Berea College, Kentucky, Atlanta University, and Tuskegee, Alabama, of which Dr. Booker T. Washington (*q.v.*), was for many years the distinguished director. The American Missionary Society now supports 8 schools of academic grade, 29 normal schools, and 64 industrial schools. Clarke University and Gammon Theological Seminary are devoted to higher education. The Baptists support 15 schools, and Spellman Institute, Atlanta. The negroes themselves have established over 150 private schools in the south having a

property value of about $2,500,000. These schools have reduced illiteracy in their territory from 90 to 30 per cent. The total income of negro public schools in round numbers is $1,000,000. Northern philanthropists have bought property for private schools to the value of about $27,000,000 and contribute about $3,000,000 annually for their support.

NEGROS, an island of the Philippine group. It has a length of about 130 miles, an area of 5,000 square miles, and a population of about 500,000. See PHILIPPINES.

NEHAVEND (30° 40′ N., 48° 20′ E.), town, province of Nehavend, Persia; scene of Persian defeat by Saracens, 641 A. D.

NEHEMIAH (fl. 450 B. C.), Jewish patriot; obtained permission from Artaxerxes to rebuild Jerusalem; put down abuses; see Books of *Ezra* and *Nehemiah* in Bible.

NEIDIG WILLIAM JONATHAN, an American writer; *b.* at Western Coll., Ia., *s.* of Abram Hershey and Lucyna Davis Neidig. He was educated at Leland Stanford, Jr., University, the University of California and at the University of Chicago. He was editor of the *Railroad Gazetter*, San Francisco, *1897-8*; subeditor of *The Argonaut, 1898-9*; book editor of *The Wave, 1899-1900*; instructor in English at Stanford University, 1901-4, and same at the University of Wisconsin from 1905-11. In addition to contributing to leading magazines he wrote: *The First Wardens, 1905*, (nominated for the Nobel prize in idealistic literature); *False Dates on Shakespeare Quartos, 1910*, and *The Fire Flingers. 1919.*

NEIHARDT, JOHN GNEISENAU, (1881), an American author; *b.* at Sharpsburg, Ill., *s.* of Nicholas N. and Alice May Culler Neihardt. He completed a scientific course at Nebraska Normal College in 1897. He lived among the Omaha Indians from 1901-7 to study their lives, character and history and was appointed post laureate, Nebr., by act of legislature in 1921. Author: *The Divine Enchantment, 1900*; *The Song of Three Friends*, (prize as best volume verse by Poetry Soc. America), *1919*; *The Splendid Wayfaring, 1920*; *Two Mothers*, (dramas), *1921*, and *Laureate Address, 1921.* Editor: *The Poet's Pack, 1921.* He also contributed verse and fiction to various magazines and was literary critic of the *Minneapolis Journal* from 1912.

NEILL, CHARLES PATRICK (1865), Ex-United States Commissioner of Labor; *b.* in Rock Island, Illinois, December 12, 1865. Studied at Notre Dame University 1885-1888, University of Texas 1888-1889. (A. B. 1891., LL. D. Johns Hopkins 1897. Notre Dame 1908.) Instructor Notre Dame University 1891-1894. Assistant-professor of political economy Catholic University, Washington, 1897-1903. U. S. Commissioner of Labor, February 1905 to March 1913. Commissioner of Labor Statistics 1913. Manager Bureau of Information, Southwestern Railroads, Washington, 1915-1921. Director National Catholic Service School 1921. Vice-President Board of Charities, Washington, 1900-1908. Assistant-Recorder Anthracite Strike Commission 1902. Recorder Arbitration Board, Birmingham, 1903. Member U. S. Immigration Commission 1907-1911. President American Statistics Association 1907-1910.

NEILSON, JULIA (1869), Eng. actress, wife of Fred Terry, and mother of Phyllis and Dennis Neilson-Terry; made début at Lyceum, London, in Sir W. S. Gilbert's *Pygmalion and Galatea*; leading lady under Mr. Rutland Barrington, and subsequently acted with Beerbohm Tree; achieved marked success in *A Man's Shadow, The Dancing Girl, Hypatia, Sweet Nell of Old Drury*, and, above all, as Rosalind in *As You Like It*; toured in U. S. and Canada.

NEILSON, WILLIAM ALLAN (1869), College President; *b.* in Doune, Scotland. In 1891 graduated from the University of Edinburgh. From 1893-1895 a teacher in Canada and Scotland. At Bryn Mawr College in 1898-1900. Instructor at Harvard for four years. At Columbia University from 1904-1906, adjunct professor and professor of English at Harvard 1906-1917. Since 1917 President of Smith College. Author of: *Origins and Sources of the Court of Love, 1899*; *Essentials of Poetry, 1912*; *The Facts About Shakespeare, 1913*; *Burns, How to Know Him, 1917*; *A History of English Literature, 1920.* Editor: *Milton's Minor Poems, 1899*; *Shakespeare's Complete Works*, (Cambridge Poets), *1906*; *The Types of English Literature, series beginning 1907, The Chief Elizabethan Dramatists, 1911*; *The Tudor Shakespeare, 1911*; *Harvard Classic Shelf of Fiction, 1917.*

NEISSE (50° 30′ N., 17° 20′ E.), town, on Neisse, Silesia, Prussia; furniture, machinery. Pop. 26,000.

NEISSE (1) **LAUSITZER** or **GÖRLITZER NEISSE** (51° 30′ N., 15° E.), river, Silesia and Brandenburg, Prussia; joins the Oder. (2) **GLATZER NEISSE** (50° 30′ N., 17° E.), river, Silesia, Prussia; joins Oder.

NEITH, NEIT, goddess in Egyptian mythology; equivalent to Minerva.

NEJD (28° N., 45° E.), central province of Arabia, bounded by Nafud Desert, El Hasa, Dahna Desert, Asir, and Hejaz; chief river basins are Wadi Rumma and Wadi Dawasir; capital, Hail; Wahabi capital, Riad. Wahabis, who were overcome by Mehemet Ali in 1818, still retain considerable power in vicinity of Riad. Pop., *c.* 1,000,000.

NEJEF, MESHED-ALI (32° N., 44° 28′ E.), town, on Lake Nejef, Asiatic Turkey; place of pilgrimage.

NEKTON, the group of animals, such as whales and fishes, which are capable of swimming freely and roaming at will over large tracts of ocean.

NELLORE (14° 26′ N., 80° E.), chief town of Nellore district, Madras, India; on Pennar. Pop. 33,000; (dist.), 1,500,000.

NELSON (1) (53° 50′ N., 2° 12′ W.), town, Lancashire, England; cotton-mills. Pop., 1921, 40,690. (2) (41° 17′ S., 173° 19′ E.), seaport, Nelson, New Zealand; bp.'s see. Pop., 1921, 10,632. (3) (49° 33′ N., 117° 20′ W.), mining town, Brit. Columbia, on Lake Kootenay. Pop., 5,500. (4) (56° 35′ N., 95° W.), river, Canada; outlet of Lake Winnipeg into Hudson Bay.

NELSON, CHARLES ALEXANDER (1839), librarian; *b.* at Calais, Maine. Graduated from Harvard in 1860. In 1857-1860, 1863-1864 assistant at the Harvard College Library; teacher from 1860-1861, 1863-1864. In the quartermasters' department of the United States Army from 1864-1865 as civil engineer. In 1865-1874 at Newbern, North Carolina, held various civil offices. At Drury College, Missouri, 1879-1880 as professor of Greek. Has been librarian at numerous libraries including the Astor Library, New York and Howard Memorial Library, New Orleans. Author of: *Waltham, Past and Present, 1879*; *The Manuscripts and early Printed Books Bequeathed to the Long Island Historical Society by S. B. Duryea, 1897*; Compiled and edited the catalogue of the Astor Library (four volumes), 1886-1888. Edited Libraries of Greater New York, 1902. Compiled Index of I. N. Phelps Stokes Inconography of Greater New York, (five volumes), 1915-1922.

NELSON, EDWARD WILLIAM (1855), naturalist; *b.* at Manchester, New Hampshire. In 1875 graduated from Cook County Normal School, Chicago. Explored in Alaska in the interests of science from 1877-1881. In 1881 he was the naturalist on board Steamer Corwin in the Arctic search for the Jeannette. Since 1890 with the Bureau of Biological Survey, Department of Agriculture. A member in 1890-1891 of the Death Valley expedition, (Department of Agriculture). Author of: *Report of Natural History Collections Made in Alaska, 1887.* Monographs: *Birds of Bering Sea and the Arctic Ocean* (cruise of the Corwin), in *1881*; *Squirrels of Mexico and Central America, 1883*; *Proceedings Washington Academy of Sciences, 1899*; *Rabbits of North America*; *The Eskimo About Bering Straits, 1909*; *Mammals of North America, 1918.*

NELSON, FRANK (1865), College President. In 1892 graduated from State University of Iowa. Platform lecturer and teacher for many years. Under Republican National Committee, in political campaigns. In 1899-1903 at Kansas, state superintendent of public instruction. Since 1907 President of Minnesota College. In 1920 the candidate for Republican nomination for Governor of Minnesota. Wrote for religious and educational journals.

NELSON, HENRY LOOMIS (1846-1908), American lawyer and journalist; *b.* in New York, January 5, 1846: died there February 29, 1908. After taking a course at Williams College he studied law and was admitted to the bar in 1869. He was Washington correspondent for the *Boston Post*, 1875-1885, and editor of the paper 1885-1886. Editor of *Harper's Weekly*, 1894-1898, and from 1902 until death, professor of political science at Williams College. Publications: *Our Urgent Traffic Laws, 1884*; *The Men We Need, 1896*; and *The United States and its Trade, 1902.*

NELSON, HORATIO NELSON, VISCOUNT (1758-1805), Brit. admiral; *s.* of Rev. Edmund N., rector of Burnham Thorpe, Norfolk; *b.* Sept. 29; delicate, ailing child of poor physique; entered navy, 1771, under his uncle, Capt. Suckling, on *Raisonable*, and rose speedily by Suckling's influence. In *Agamemnon* took part in sieges of *Bastia* and *Calvi*, in Corsica, 1793, losing one eye before Calvi. By disobedience of orders N. won for Sir John Jervis brilliant victory off *Cape St. Vincent* against Spain, 1797; received Order of Bath and annual pension of £5000; lost right arm in hopeless attack on *Teneriffe*; sent to intercept Napoleon's proposed invasion of England, 1798, discovered entire Fr. fleet in *Aboukir Bay*, surrounded and destroyed it in *Battle of the Nile*, Aug. 1; cr. Baron N. of the Nile with £1000 yearly; aided in driving

French from Naples, receiving dukedom of Bronte and Neapolitan fief. Denmark was chief sea-power on which Napoleon relied, and in 1801 Britain dealt heavy blow to Napoleonic plans by great victory of *Copenhagen*, by which six Dan. ships were seized, and Baltic reopened. In 1805 he prevented junction of Fr. and Span. fleets in Channel and engaged enemy off *Cape Trafalgar*, Oct. 21, where he gave well-known signal, 'England expects that every man will do his duty.' Though slain in fight, he inspired victory.

NELSON, KNUTE (1843-1923), U. S. Senator; *b.* in Norway. He came to the United States in 1849, was educated at Albion College and afterwards served during the Civil War and was wounded and captured at Port Hudson. He was admitted to the bar in 1867 and afterwards held various important political positions. He was a member of the 48th to 50th Congresses (1883-9), 5th Minn. Dist., was elected governor of Minnesota in 1892 and re-elected in 1894 but resigned the following year and was then United States senator for 5 terms, 1895-1925.

NELSON, RICHARD HENRY (1859), Bishop; *b.* in New York. Graduated from Trinity College, Connecticut, in 1880. At St. John's Church, Stamford, assistant from 1883-1884. In 1884-1887 rector of Grace Church, Waterville, New York. At Christ Church, Norwich, Connecticut, 1887-1897. From 1897-1904 at St. Peter's Church, Philadelphia. In 1904 at Albany, New York, consecrated bishop coadjutor. In 1913 became bishop of Albany.

NELSON, SAMUEL (1792-1873), American jurist; *b.* in Hebron, New York, November 10, 1792, *d.* in Cooperstown, New York, December 13, 1873. He graduated from Middlebury College, Vermont, in 1813 and was admitted to the bar in 1817. Circuit judge 1823-1831, assistant justice New York Supreme Court, 1835, and associate justice of United States Supreme Court in 1845. He upheld Chief Justice Taney in the Dred Scott case. The opinion was that if Congress could destroy slavery it could also establish it. He was a member of the Alabama Arbitration Commission in 1871 and retired from the bench in the following year.

NELSON, WILLIAM ROCKHILL (1841-1915), American journalist; *b.* in Fort Wayne, Indiana, 1841; *d.* in Kansas City, in 1915. He was educated at the University of Notre Dame, Indiana, studied law, and was admitted to the bar. Member of the National Democratic Convention that nominated Tilden in 1876. He lost a fortune made as a contractor in a speculation in cotton growing in Georgia. His interest in the Fort Wayne Sentinel which he bought in 1870 was sold in 1880 and with S. E. Morse, (who soon retired), he founded the Kansas City Star, an evening daily paper. In 1901 he purchased the Kansas City Times, which had failed, and made it the morning edition of the Star. His career as editor and publisher was marked by sturdy independence and originality of methods, which made the Star one of the famous newspapers of the United Sates.

NELSON RIVER, a riv. of Canada, flowing from the N. extremity of Lake Winnipeg, which after a course of over 400 m. in a generally N. E. direction, empties its waters into Hudson Bay at York Factory. It is navigable for nearly 130 m. for vessels of moderate draught.

NELSONVILLE, town in Athens co., Ohio, on the Hocking River and the Hocking Valley railroad. Extensive bituminous coal mines exist in the vicinity and a large business is done in connection with the shipment of this product. The leading industrial establishments are foundry and repair shops, car-wheel works and plants for the manufacture of mining implements. The waterworks and electric lighting plant are owned and operated by the city. There are excellent schools, numerous churches, two banks and a newspaper. Pop., 1920, 6,440.

NEMATODA, Round-Worms, Thread-Worms, Hair-Worms, etc.; the largest and most important class of Nemathelminth of Round-Worms. Many are parasitic, and as such are harmful even to man, but they occur also in the earth and in both fresh and salt water. Nematodes are ivory white or transparent creatures, with a thick protecting cuticle, and groups of longitudinal muscles only, intervals between which are indicated by two 'lateral lines.' There is a well-developed food canal, a mouth and anus, and a peculiar excretory apparatus which opens to the exterior by an anterior pore.

NEMATOMORPHA, HAIR WORMS, long, unsegmented, hair-like worms, which when adult live, with one marine exception, in ponds and ditches.

NEMESIS, Gk. goddess, personification of heavenly retribution, akin to the Furies, sometimes confused with other cults; punished those who gained overmuch or who were arrogant.

NEMI, ancient *Nemorensis Lacus* (41° 43′ N., 12° 42′ E.), lake, Italy, occupy-

ing extinct crater in Alban Mountains; on shore are remains of ancient Rom. temple to Diana.

NEMOURS (48° 14′ N., 2° 42′ E.), town, Seine-et-Marne, France; sand quarries. Pop., 5,200.

NEMOURS, title of famous Fr. family; duchy (cr. 1404) was granted to Jean d'Armagnac, 1452, Gaston de Foix, 1505, house of Savoy, 1528-1659, and then to house of Orleans, in junior branch of which it remains. Among its distinguished members is Marie, Duchesse de N. (1625-1707), whose *Mémoires* were pub. 1709.—**LOUIS CHARLES PHILIPPE RAPHAEL, DUC DE N.** (1814-96), *s.* of Louis Philippe; *b.* Paris; refused crown of Belgium, 1831, of Greece, 1832.

NEODYMIUM. 144-3. A rare metal, yellowish in color, with a melting point of 840° C. and a specific gravity of 6.956. It occurs in the cerite earths which are found in Scandinavia, Siberia, North America and other parts of the world. The metal was first isolated in 1885 by Auer von Welsbach, who separated didymium (previously classified as an element) into neodymium and praseodymium. Neodymium forms a stable sesquioxide, $Nd^2 O^3$, and its salts are of a rose to a violet-red color. The metal has no commercial importance at the present time.

NEOLITHIC, see GEOLOGY.

NEON. Atomic Weight 20.2. A colorless, odorless, tasteless, inert gas occuring in very small quantities in the atmosphere. It was discovered by Ramsay and Travers in 1898. It exists in the air to the extent of about 15 parts per million, and also occurs in the gases evolved from many thermal springs. It is condensed with greater difficulty than any other gas, with the exception of hydrogen and helium. When shaken in a tube with mercury, neon produces a red glow, but on long shaking the glow disappears, and can only be restored by sparking the gas. Devices for testing automobile spark plugs and similar electrical equipment make use of the property possessed by neon of glowing when brought in proximity to an electric current.

NEOPHRON, genus of vultures with horizontal nostrils; found in Egypt and India.

NEO-PLATONISM, see PLATO.

NEPAL, NEPAUL, or **NIPAL,** independent state in N. E. of India (28° N., 84° E.), bounded N. by Tibet, W. by Kumaon, S. by United Provinces, Bihar and Orissa, and Bengal, and E. by Sikkim and Bengal. Northern portion is lofty and mountainious region, containing part of Himalaya range with some of the highest summits in the world; besides Mount Everest (29 000 ft.), Kinchinjunga (*c.* 28,000 ft.), and Dhaulagiri (26,000 ft.), there are many other peaks over 20,000 ft. high. In S. are stretches of fertile and cultivated country called *Tarai.* State is watered principally by Gogra, Gandak, Sun Kosi, and their tributaries; chief towns, Katmandu (cap.), Patan, and Bhatgaon. Owing to differences in altitude there is great variety of flora and fauna; cotton, rice, corn, wheat, barley, oats, pulse, hemp, sugar-cane, tobacco, dyes, drugs, vegetables, fruits, and flowers cultivated; forests produce fine timber. Among wild animals are tiger, leopard, wolf, hyena, rhinoceros, and elephant. Nepal supplies marble, iron, limestone, zinc, lead, copper, and sulphur; mineral springs numerous; chief occupation is agriculture, many of the inhabitants being engaged in terracing and irrigating land. Manufactures include metallic wares, pottery, paper, and textiles; communication in a backward state. State is inhabited by several different tribes, most important being warlike Gurkhas, who came originally from Rajputana and took possession of country; war broke out between them and British in 1814, and concluded with Peace of Segowlie in 1815, after which Gurkhas became friendly and allowed Brit. resident to live in capital; later assisted British in Mutiny. On outbreak of World War military resources of state were placed at disposal of Brit. Government, large sums of money offered for purchase of arms and munitions for Gurkha regiments, and substantial donations given to war funds. Government is in hands of a prime minister, who represents the Maharajahdhiraja. Area, *c.* 54,000 sq. m.; pop., *c.* 5,600,000. See Map of S. and E. Asia.

NEPENTHE, term applied to anything causing oblivion of pain or grief, from an Egyptian drug mentioned in *Odyssey.*

NEPENTHES, genus of climbing plants ('pitcher-plants'), of order *Sarraceniales,* found in the East Indies, the ends of the leaves expanding into pitchers which secrete a digestive fluid.

NEPHELINE, white or yellowish mineral occuring in volcanic rocks; consists of sodium, potassium, and aluminium silicate.

NEPHELINTES, a group of colorless and transparent rocks containing nepheline; one of the lavas of Tertiary period.

NEPHELINE - SYENITE, ELÆO-ITE-SYENITE, a white or grey holo-ystalline rock, rich in alkalis and umina, and found in volcanic and plu-onic rocks in small masses or veins; esembles granite in appearance, and of re occurence; numerous varieties.

NEPOMUK, JOHN OF (fl. XIV. nt.), patron saint of Bohemia; tor-ured and killed in ecclesiastical dispute y Wenceslaus IV., 1393; subject of any legends; canonised, 1729.

NEPOS, CORNELIUS (*c.* 99-24 B.C.), om. historiographer; works include *hronica* (compressed history of world), *e viris illustribus* (lives of famous men); verting but not altogether reliable.

NEPTUNE, the farthermost known anet of the solar system, its distance om the sun being approximately 2800 illion miles or thirty times that of the rth. Owing to its great distance it is visible in all but the largest telescopes. The discovery of N. ranks as one of e greatest triumphs of mathematics. C. Adams and Le Verrier independent-discovered the planet theoretically in 46 from computations based upon cer-in observed irregularities in the move-ents of Uranus, at that time the outer-ost planet of solar system.

The diameter of N. is about 37,000 les, and no less than 164 years is re-ired for it to complete one revolution its huge orbit around the sun. It has least one satellite.

NEPTUNE, or **POSEIDON,** in Greek ythology, was the god of the sea and e son of Chronos and Rhea. He was entified by the Romans with their god ptune. He, with his brothers, Zeus d Hades, was swallowed by his ther, but thrown up. He married mphitrite, and had sway over the a, the winds, and earthquakes, his mbol of power being a trident. His lace was at the bottom of the sea, ar Algæ in Eubœa, where he kept s chariot and his stud of horses. He ilt the walls of Troy, but not being varded for his deed, he showed placable hatred towards the Tro-ns. He contended with Athens for tica, and conspired against the sover-nty of Zeus.

NEREIDS, in Greek mythology, the mphs of the sea, the *dau.* of Nereus d Doris. The most famous of them re Amphitrite, the *wife* of Poseidon; etis, the *m.* of Achilles, and Galatia. e Nymph.

NERI, FILIPPO DE' (1515-95), Ital. est; did much by charity to alleviate verty in Rome; founded the Congrega-tion of the Oratory, which Cardinal New-man introduced into England; canonised, 1622.

NERO (37-68), Rom. emperor, 54-68; *s.* of Gnæus Domitius Ahenobarbus; adopted by Emperor Claudius, 50, his mother, Agrippina, having become em-press, 49; m. Octavia, *dau.* of Claudius, 53; on death of Claudius, 54, poisoned by Agrippina, latter secured throne for Nero. Five years of benevolent rule by Seneca and Burrus ensued; they were opposed by Agrippina, whom Nero, however, imprisoned and caused to be murdered. Nero's mistress, Poppæa Sabina, obtained chief power; secured murder of his wife and her own marriage to him, 62; Burrus and others murdered, 62; revolt of Boadicea in Britain put down, 61; great fire, 64, nearly destroyed Rome; said to have been planned by Nero; Rome splendidly rebuilt, but the cost raised revolts; conspiracy, 65, in which prætorians were implicated, led to reign of terror; revolt of Vindex in Gaul and Galba in Spain, 68; Galba declared emperor, and Nero escaped execution by suicide. Last of first imperial line, N. was noted for persecution of Chris-tians; ranks in history as supreme type of vice of frivolity.

NERVA, MARCUS COCCEIUS, Rom. emperor, 96-98 A. D.; elected, when over 60 years of age, by Senate on murder of Domitian; *lex agraria* provided lands for poor citizens; measures for supporting poor children in Ital. towns; taxation reduced; won victory against Suebi; adopted Trajan as successor and col-league, 97.

NERVAL, GÉRARD DE, GÉRARD LABRUNIE (1808-55), Fr. author; wrote *Chansons et Ballades populaires du Valois, Emilie, Souvenirs de la Revolution,* translation of Goethe's *Faust, Filles du Feu,* etc.; highly praised by Gautier; unhappy life ended in suicide.

NERVES, see Nervous System.

NERVI (44° 22′ N., 9° 4′ E.), town, winter resort, on Gulf of Genoa, Genoa, Italy. Pop., 7,500.

NERVOUS DISEASE. See Mental Hygiene; Nervous System.

NERVOUS SYSTEM includes the central nervous system, comprising the brain and spinal cord; the peripheral nervous system, comprising the cranial nerves, the spinal nerves, and the sense organs—eye, ear, organ of smell, organ of taste, touch corpuscles; and the sym-pathetic nervous system. Of these the brain, spinal cord, and the various sense organs are treated in separate articles

elsewhere. The tissue of the nervous system is composed of nerve cells, nerve fibres, and a connective tissue termed neuroglia. The nerve cells vary from practically the smallest to much the largest size of cell in the body, and they have numerous branches. One of these branches, termed the axon, or axis cylinder, is a nerve fibre, while the others break up into finer branches and come into relation with similar branches of neighboring nerve cells. The nerve cells are situated mainly in the brain and spinal cord, and their function consists in receiving, sending out, or in taking part in transmitting nervous impulses. The nerve fibres are the main processes, or axons, of the nerve cells, only one axon coming from each cell, and they may be either non-medullated—*i. e.*, without any covering, or with only a fine membranous sheath, the neurilemma; or medullated—*i. e.*, enclosed in a sheath of fatty substance termed myelin, which is usually covered by the neurilemma. At regular intervals of about 1-25 of an inch the myelin is interrupted by constrictions, termed the nodes of Ranvier, which are characterized by staining deeply with silver nitrate in microscopic preparations. The axon runs without interruption from a nerve cell to a sense organ. The neuroglia is of two types, that lining the ventricles of the brain and the central canal of the spinal cord, consisting of columnar cells, while elsewhere it is formed of small branching cells, the processes of which, except in the grey matter of the brain, interlace with the processes of the nerve cells.

According to the simplest classification, twelve pairs of cranial nerves spring from the brain. The first pair are the olfactory, which are merely prolongations of the brain forwards, and their filaments are distributed to the mucous membrane of the nostrils. The second pair are the optic or sight nerves. The third, fourth, and sixth pairs are distributed to the muscles of the eye, and being motor, they control the movements of the eyeballs. Each of the fifth pair of nerves is very large, and has three great branches. They are partly sensory and partly motor, and are distributed to the skin and muscles of the face as well as to part of the tongue. The seventh pair comprise the facial nerves. The eighth are the auditory or ear nerves. The ninth are partly concerned with taste and partly motor. The tenth pair are known as pneumogastric or vagi (wanderers), and they are distributed to the thoracic and abdominal organs. The eleventh pair contain motor filaments for the muscles of the neck, while the twelfth, or *hypoglossal*, supply the muscles of the tongue. Of the spinal nerves, thirty-one spring from each side of the cord. They are classified into eight cervical pairs, twelve dorsal, five lumbar, five sacral, and one coccygeal pair. Each spinal nerve has an anterior or motor root, and a larger posterior and sensory root, with a ganglion upon it. The two roots coalesce, and many of the spinal nerves unite at some distance from the cord to form a network or plexus.

The *sympathetic system* forms a double chain of ganglia, one on each side, or slightly in front, of the spinal column. These ganglia communicate with each other and with the spinal nerves by delicate commissural threads. Nerves arise from the ganglia, and are distributed chiefly along the bloodvessels. They also form considerable plexuses about the thoracic and abdominal viscera—*e.g.*, the *hypogastric plexus*, which lies just above the bifucration of the aorta. Free intercommunication exists between the sympathetic and cerebro-spinal systems, and many of the sympathetic fibres are ultimately derived from cranial and spinal nerves and centers.

Pathology.—The path of motor impulses from the brain is in two segments, the upper extending from the cortex of the brain to the anterior horn of grey matter in the spinal cord, while the lower extends from the anterior horn of grey matter to the termination of the motor nerve fibres in the muscles. The symptoms caused by a lesion of the motor path depend on whether it is in the upper or lower segment; if it is in the upper there is muscular weakness without muscular wasting, without changes in the electrical reactions, while if it is in the lower there is weakness and wasting and change in the electrical reactions. The path of sensory impulses is in three segments, of which the lowest has its nerve cells in the ganglia of the posterior roots of the spinal nerves, from which one process goes to the muscles and skin etc., and another to the spinal cord while the upper two segments serve as links in the chain to the brain. According to the segment of the path of affected, the symptoms of a lesion of the sensory path differ, and different kinds of sensation may be deranged separately from one another, such as the sense of touch, pain, heat and cold, muscular sense, the sense of vibration.

When a nerve has been divided, the part which is farther from its nerve cell or origin undergoes degeneration, the myelin sheath and axis cylinder breaking up and disappearing, the neurilemma remaining, its nuclei multiplying. From the central part of the divided nerve the axis cylinder elongates and grows out to

the sheath of the farther part, which it penetrates, and grows along inside it to its termination, the myelin sheath then also regenerating.

Inflammation may involve chiefly the sheath of the nerve, the interstitial tissue, or the nerve fibres themselves. When the interstitial tissue is the subject of inflammation the nerve is swollen, red in color, and infiltrated with round cells, while the nerve fibres are not affected to any extent. When the nerve fibres are primarily affected the changes resemble those in degeneration after division of a nerve, the myelin and axis cylinders breaking down and disappearing, and the nuclei of the neurilemma multiplying.

The causes of inflammation of the nerves are various, and include overindulgence in alcohol, cocaine, opium morphia, tobacco; the poisonous effects of arsenic, carbon monoxide, lead, mercury, toxins in such diseases as beriberi, diphtheria, influenza, measles.

NESBIT, WILBUR DICK (1871), an American author; *b.* at Xenia, Ohio, *s.* of John Harvey and Isabel Fichthorne Nesbit. He was educated in public schools at Cedarville, Ohio. After being a feature writer on the *Baltimore American*, *Chicago Triune* and the *Chicago Evening Post* from 1899-1912, he was vice president of William H. Rankin Co., Chicago. In addition to contributing stories and poems to various magazines and periodicals he was the author of: *The Trail to Boyhood, 1904*; *The Gentleman Ragman, 1906*; *The Land of Make-Believe* and other *Christmas Poems, 1907*; *A Friend or Two, 1908*; also *Your Flag and My Flag*, and others.

NESS, LOCH (57° 15′ N., 4° 30′ W. lake, Inverness, Scotland; length 22), miles; Oich River joins it to Caledonian Canal on S., the Ness and Canal link it with Moray Firth on N.; celebrated for scenery.

NESSELRODE, KARL ROBERT, COUNT (1780-1862), Russ. diplomatist and statesman; representative of Russia in councils of Allies, 1813-14; helped to draw up Treaties of Paris and to form Holy Alliance; supported war policy against pagan Turkey and revolutionary Hungary, but opposed war with Prussia.

NEST, a structure built by various kinds of animals to protect their eggs or young during immaturity. Amongst birds, with whom nest-building or *nidification*, is most common, the n. may vary from a simple hollow in sand lined with a few leaves or grasses, and the careless platform of the rock, the beautifully woven grass, lichen, or mossy n's of Thrushes, Finches, Wrens, and the like, the mud n's of Swallows and Oven-Birds, to the elaborate structures of the tropical Weaver-and Tailor-Birds. Claws and beak are used in building, and often salivary juices supply a medium of adhesion. (The *edible bird's nest* of China is made by Swifts with a glutinous salivary fluid which becomes hard.) But, apart from birds, nidification is practised in several other groups: typical nest-builders amongst mammals are Squirrels and Field-Mice; some fishes, such as Sticklebacks, weave masses of seaweed; even the mollusc *Lima* cements shell-fragments and débris; while amongst insects, especially the Hymenopterous Ants, Bees, and Wasps, nest-building of earth, mud, or wood-pulp is common.

NESTOR (classical myth.), *s.* of Neleus and Chloris; in Homer's epics represents wisdom of old age.

NESTOR (*c.* 1056-*c.* 1114); Russ. monk of Pechersky cloister, Kiev, to whom are attributed earliest Russ. chronicles.

NESTORIANS, followers of Nestorius, who tended to make Christ two persons. Nestorianism soon became extinct in the Rom. Empire, but it had a great career in the Middle Ages, extending at one time over nearly the whole of Asia. From VII. to XIV. cent. it was very strong in Persia, but was overthrown by Mongolian invasion. Nestorian Christians evangelised India and probably founded the Syrian Church of Malabar (traditionally ascribed to St. Thomas).

NESTORIUS (*d. c.* 450), patriarch of Constantinople, 428-31; was earnest in defense of orthodoxy against Arians, Novatians, and Quartodecimans; refused to give the title 'Mother of God' to the Virgin Mary. N. represented the more practical Antiochene school as against the more mystical Alexandrian. N. was excommunicated, but replied with counter-anathemas. At the Council of Ephesus, in 431, he was deposed; his friends pronounced depositions against the Alexandrian party, but the Ephesian decision was confirmed at Chalcedon.

NET, meshwork of knotted cord made of flax, hemp, cotton, etc., used from earliest times in fishing industry and for snaring animals; lace and silk net as ornamentation; hand-made, with wooden needle and oval stick to make mesh; generally machine-made. Fishing nets are tarred to withstand action of water.

NETHERLANDS, historical name of the N. W. corner of the European plain between France, Germany, and the

NETHERLANDS
SCALE OF MILES
0 5 10 20 30 40 50
Railroads
Canals
Submarine Cables
The World Syndicate Company, Inc., N.Y
NORTH SEA
ZEE
FRIESLAND
GRONINGEN
DRENTHE
OVERYSSEL
GELDERLAND
UTRECHT
NORTH HOLLAND
SOUTH HOLLAND
ZEELAND
NORTH BRABANT
ANTWERP
LIMBURG
EAST FLANDERS
WEST FLANDERS
BRABANT
AMSTERDAM
ROTTERDAM
HAGUE
Leeuwarden
Groningen
Zwolle
Arnhem
Nijmegen
Utrecht
Dordrecht
Leyden
Haarlem
Alkmaar
Helder
Hertogenbosch
Breda
Middelburg
Flushing
Antwerp
Ghent
Bruges
Ostend
Ypres
Courtrai
Tournay
Louvain
Brussels
Malines
Hasselt
Maestricht
Liege
Namur
Charleroi
Mons
Ath
Tirlemont
Nivelles
Wavre
Huy
Verviers
Spa
Stavelot
Malmedy
Arlon
Bastogne
Neufchateau
Virton
Rochefort
Dinant
Philippeville
Marienbourg
Thuin
Binche
Soignies
Enghien
Oudenarde
Alost
Termonde
Lokeren
Eecloo
Sluys
Terneuzen
Hulst
Axel
Goes
Tholen
Zierikzee
Ameland
Schiermonnikoog
Terschelling
West Vlieland
Texel
Vlieland
Rotterdam
Delft
Gouda
Leiden
Haarlem
Amsterdam
Zaandam
Enkhuizen
Hoorn
Medemblik
Stavoren
Sneek
Harlingen
Franeker
Dokkum
Leeuwarden
Meppel
Steenwyk
Zwolle
Kampen
Deventer
Zutphen
Apeldoorn
Harderwyk
Amersfoort
Rhenen
Wageningen
Arnhem
Nymegen
Tiel
Culemborg
Gorcum
Dordrecht
Moerdyk
Willemstad
Klundert
Oosterhout
Tilburg
Bois-le-Duc
Helmond
Eindhoven
Turnhout
Lierre
Malines
Louvain
Tirlemont
Diest
Hasselt
Tongres
Maestricht
Visé
Verviers
Spa
Stavelot
Malmedy
Liege
Huy
Namur
Dinant
Philippeville
Marienbourg
Charleroi
Binche
Thuin
Mons
Soignies
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Lokeren
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Bruges
Ostend
Ypres
Courtrai
Sluys
Terneuzen
Hulst
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Goes
Tholen
Zierikzee
Flushing
Middelburg
Veere
Ameland
Schiermonnikoog
Terschelling
West Vlieland
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Vlieland
Rotterdam
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Haarlem
Amsterdam
Zaandam
Enkhuizen
Hoorn
Medemblik
Stavoren
Sneek
Harlingen
Franeker
Dokkum
Leeuwarden
Meppel
Steenwyk
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Apeldoorn
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Amersfoort
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Ostend
Ypres
Courtrai
Sluys
Terneuzen
Hulst
Axel
Goes
Tholen
Zierikzee
Flushing
Middelburg
Veere
3° 30′ A 4° B 4° 30′ C 5° 20′ D 6° E 6° 30′ F 7° G 7° H
52° 30′
52°
51° 30′
51°
5° 20′ A 6° B 6° 30′ C 5° Longitude D East 5° 30′ from Greenwich 6° F 6° 30′ G 7° H

forth Sea, now divided into the modern ingdoms of **HOLLAND** and **BELGIUM**, nder which headings its history is reated. The Batavian island in the hine delta was the core of the country; s inhabitants, the Batavians or Batavi, ave their name to the Batavian Republic, established in alliance with the rench in 1794. **FLANDERS**, created fief by Charles the Bald (A.D. 863), as the popular name of a wide and indefinite tract of Belgic country. France ecured the whole of it between 1794 and 814; it was incorporated in the Netherands in 1815, and since 1831 has been art of Belgium. See HOLLAND.

NETHERSOLE, OLGA (1870), Eng. ctress; joined Garrick Theatre, 1889; oured in Australia, 1890; lessee and anager, Court Theatre, London, 1894; anager of Her Majesty's Theatre, 1898; Adelphi, 1902; where she produced e much-criticized play *Sapho*; of naftesbury, 1904; made brilliant début t Théâtre Sarah Bernhardt, Paris, 907, playing in *La Dame aux Camélias*, *he Second Mrs. Tanqueray*, etc.; ppeared in America in 1910-11.

NETHINIM, 'those given to the anctuary,' mentioned in *Ezra* and *Nehemiah* as a distinct but inferior class Temple ministers, said to have been rst app. by David.

NETTLE, herbaceous plant of order *Urticaceæ*; two varieties in Britain, *Urtica dioica* and *U. urens*. Former rge with heart-like foliage and clustered reen flowers, latter small with elliptical owers. The usual remedy for a n. sting to apply to the part affected a crushed ock-leaf, which is usually to be found the vicinity. Dead Nettle (*Laminum*) as white or purple flower and square em.

NETTLERASH, URTICARIA, skin sease characterised by the appearance wheals, accompanied by stinging nsation; may be due to external irrition, to certain articles of food, *e.g.*, ellfish, or certain drugs, *e.g.*, copaiba, digestive or genito-urinary disturbnces, or other causes; the treatment is st a purge to clear away any irritation alimentary canal; a light diet, bisuth, strychnine, and ichthyol are benedial, and a change of air and tonics in ronic cases; an application of a weak lution of carbolic acid, and alkaline ths, relieve itching.

NETTLETON, WALTER (1861), rtist; *b.* at New Haven, Connecticut. 1883 graduated from Yale College. died art at Yale School of Fine Arts d Art Student's League, New York. In 1884 in Paris began to paint. In 1889 first picture exhibited at Paris Salon. Constant exhibitor at Society of American Artists, Paris Salon, Pennsylvania Academy of Fine Arts. National Academy of Design. In 1900 voted exempt from jury examination at Paris. Awarded silver medal at St. Louis Exposition, 1904. 1910 a bronze medal at Buenos Aires.

NETTUNO (41° 27′ N., 12° 40′ E.), fishing village, Rome, Italy.

NETZE (53° 5′ N., 16° 56′ E.), river, Posen and Brandenburg, Prussia; joins Warthe.

NEU-BRANDENBURG (53° 32′ N., 13° 15′ E.), town, on Lake Tolensesee, Mecklenburg-Strelitz, Germany, iron foundries. Pop., 13,000.

NEUCHÂTEL (47° N., 6° 45′ E.), western canton of Switzerland, bounded by France, cantons of Vaud and Berne and Lake Neuchâtel; area, *c.* 312 sq. miles. Surface is chiefly mountainous, Jura range crossing canton from S. W. to N. E.; highest peak Mont Racine (*c.* 4,730 ft.). Pop., 1921, 131,350.

NEUCHÂTEL (47° N., 6° 55′ E.), capital of Neuchâtel Canton, Switzerland; ancient castle and cathedral; watches, jewelery. Pop., 1921, 25,150.

NEUCHÂTEL, LAKE OF, ancient *Lacus Eburonensis* (46° 55′ N., 6° 50′ E.), lake, Switzerland; outlet by Thièle into Aar.

NEUHALDENSLEBEN (52° 15′ N., 11° 25′ E.), town, on Ohr, Prussian Saxony; pottery. Pop. 11,000.

NEUILLY, TREATY OF. See BULGARIA.

NEUILLY-SUR-SEINE, W. suburb, Paris; favorite residence of Orleans family. Pop., 1921, 51,590.

NEU MECKLENBERG (3° S., 152° E.), island, Bismarck Archipelago, W. Pacific.

NEUNKIRCHEN, OBER-NEUNKIRCHEN (49° 20′ N., 7° 9′ E.), town, Rhine province, Prussia; ironworks and colleries. Pop. 34,000.

NEU-POMMERN, formerly **NEW BRITAIN** (6° S., 150° E.), island, Bismarck archipelago, W. Pacific.

NEUQUEN (39° S., 69° W.), territory, Western Argentina, S. America; mountainous; capital, Chosmalal. Pop., 1921, 33,574.

NEURALGIA, term applied to pain in a nerve unaccounted for by any organic affection, predisposed to by a tendency

to nervous affections, by anæmia and other debilitated states, by gout, rheumatism, and other conditions in which the state of the blood is affected. The chief symptoms are paroxysmal, sharp pains, with a dull aching between the paroxysms, or the pain may be continuous, boring, or aching; tender spots can usually be found along the course of the nerve; the skin may be flushed, pale, or perspiring. The local causes of N. may include pressure on the nerve by a tumor, or through disease of bone or other tissue; exposure of the nerve is an important cause; the cause may be reflex, such as irritation of the teeth, or of the stomach by certain foods.

NEURASTHENIA is a general term applied to weakness or exhaustion of the nervous system, which may be due to overwork, anxiety, and other mental disturbances, a neurotic tendency, overindulgence in alcohol or other stimulants, and in tobacco, and mistakes in dietary. It is more common in men than in women, and the symptoms may include general malaise, with depression or excitement, headache, insomnia, or disturbed sleep, noises in the ears, disturbances of vision, of sensibility, and of the stomach and other organs, while there is usually muscular weakness and wasting. The condition is easily amenable to treatment, which consists of complete rest, change of air, attention to diet, with plenty of nourishing food, and tonics. *Traumatic neurasthenia*, or 'railway spine,' is the neurasthenic condition due to injury following railway accidents the subjective symptoms may be many and various, while objective signs may be few or absent, as in other conditions of neurasthenia, and it is usually found that when the patient's claim for damages has been settled, either favorably or adversely, the condition improves.

NEURITIS, inflammation of one or more nerves, affecting either the sheath of the nerve, its interstitial tissue, or the nerve fibres themselves. Acute neuritis affecting a single nerve may be due to prolonged pressure, to extension of inflammation from a neighboring part, or to an unhealthy condition of the blood, as in gout. Treatment is, first, a mercurial purge (*e. g.* calomel), followed by a dose of salts; the affected part must have complete rest and fomentations applied to it, while if pain is intense, cocaine may be injected over the nerve; in chronic cases, counter-irritants and electricty are valuable.

In multiple neuritis the nerve fibres are generally affected, the causes of the condition including poisons, such as lead and arsenic, alcohol and carbon monoxide, the toxins of such diseases as diphtheria, influenza, measles, and unhealthy conditions of the blood, as in diabetes or general debility.

The treatment includes careful dieting (no alcohol being allowed), rest, and nutritious food. Fomentations and injections of cocaine are employed to relieve the pain, electricity to prevent the wasting of the muscles, and in the more convalescent stages strychnine, iron, and other tonics.

NEURITIS PERIPHARIL. See BERI BERI.

NEUROGLIA. See NERVOUS SYSTEM.

NEUROPTERA (Gk. *neuron*, nerve; *pteron*, wing), an order of Insects which used to include termites, dragon-flies, caddis-flies, may-flies, bird-lice, scorpion-flies, alder-flies, snake-flies, mantis-flies, and lace-wing flies, but which has recently restricted to the last four and a few less-known groups. These possess as common characters four almost similar glassy membraneous wings, which, in early development, are tucked in the body, and which bear a close network of nervures. They are carnivorous insects with biting jaws and large antennæ, and there is complete metamorphosis—the larva being entirely different from the adult.

NEUSALZ (51° 48′ N., 15° 42′ E.), town, on Order, Silesia, Prussia; flax-mills. Pop. 13,500.

NEUSS (51° 12′ N., 6° 41′ E.), town, ancient *Novesium*, Rhine province, Prussia, near Rhine; textiles. Pop. 37,000.

NEUSTADT, Polish **PRUDNIK** (50° 20′ N., 17° 34′ E.), town, on Prudnik, Silesia, Prussia; tanneries. Pop. 19,000.

NEUSTADT-AN-DER-HAARDT (49° 20′ N., 8° 10′ E.), town, Bavarian Palatinate, Germany; wine. Pop. 19,000.

NEU-STETTIN (53° 42′ N., 16° 43′ E.), town, Pomerania, Prussia; iron foundries. Pop. 12,000.

NEU-STRELITZ (53° 20′ N., 13° 3′ E.), town, capital, Mecklenburg-Strelitz, Germany; iron manufactures. Pop. 11,500.

NEUTER. See ZOOLOGY.

NEUTRA, cap. of the co. of Neutra, 45 m. E. N. E. of Pressburg. Its chief product is wine. It possesses a fortress and an old cathedral. Pop. 15,000.

NEUTRAL SALTS. See SALTS.

NEUTRALITY.—As far back as the XVII. cent. the rule was established that

nations taking no part in a war must refrain from giving active assistance to either belligerent. Uncertainty, however, prevailed as to how far a neutral state was bound to prevent its territory from being used for hostile purposes. U.S., in 1793, substantially laid down doctrine now prevailing—*i.e.*, that it is the duty of a neutral state to prevent any such acts as would injure one of the warring powers—*e.g.*, arming vessels or raising troops within its ports or territories. On receiving notice of outbreak of war, neutral state may issue procalmation of neutrality, such procalmation being binding on subjects of issuing state, and informing belligerents of the view which it takes of its duty on doubtful points; this procalmation, however, does not affect general law of neutrality. Neutrals must not assist belligerents with troops, ships, arms, ammunition, or money, or allow its ports and territory to be used for hostile purposes. Those privileges and advantages which by the custom of nations are granted by neutrals to belligerents must be impartially exercised. Ships of war of either belligerent are allowed to enter neutral ports and remain for limited time (under English procla- nations, twenty-four hours), and to obtain such necessary provisions, coal, and repairs as will take them to their own nearest ports. Neutral state must, within reasonable limits, prevent its subjects from assisting either belligerent, nor may it allow any act of sovereignty to be exercised within its jurisdiction on behalf of a belligerent. Neutral state, however, does not interfere with the private commercial transactions of its subjects with belligerents, who are free to raise loans, or buy goods, whether contraband or not, in neutral states. Subjects of neutral state acting outside its jurisdiction are bound to submit to rights of belligerents as to visit and search, capture and confiscation in case of contraband of war, or when attempting to run a blockade. Question of right to seize goods of a neutral in belligerent bottoms settled by Declaration of Paris as far as parties to it are concerned. Probably it may be taken as finally settled that neutral flag covers enemy goods except contraband, and neutral goods, except contraband, are free not liable to confiscation under enemy's flag.

NEUTRALIZATION. See CHEMISTRY.

NEUVE CHAPELLE, BATTLE OF.—This was the first important offensive on the Western front in the warfare of positions. Its objects were to profit by a supposed weakening of the Ger. front due to the operations proceeding in Russia, and to drive the enemy back towards Lille. The village of Neuve Chapelle lies in flat country; but beyond the village the land rises to a ridge which converges upon Fournes from Haut Pommereau, S. of Aubers, and from the direction of La Bassée.

Neuve Chapelle was encircled by a highly developed series of trenches, and it had to be taken before the ridge could be won. The bombardment was not only to shake the *moral* and thin the numbers of the enemy, but also to break down his formidable barbed-wire defenses. It began at 7.30 on the morning of March 10, 1915, and was the most violent experienced up to that time. The opposing trenches were in many places not 80 ft. apart. At 8.05 the guns changed their range, and flung their shells into Neuve Chapelle itself. At that moment the 23rd and 25th Brigades of the 4th Army Corps charged into the Ger. trenches N.W. of the village, while the Garhwali Brigade of the Indian Corps assaulted the trenches S. of the village. The trenches in the center and S. had been severely knocked about, and were carried with little difficulty; and after much isolated and fluctuating hand-to-hand fighting, Nueve Chapelle was taken, 11 a.m.

In the three days' fighting at Nueve Chapelle the Brit. losses were 190 officers and 2,337 men killed, 359 officers and 8,174 men wounded, and 23 officers and 1,728 men missing. These losses were the price of a Brit. advance of about a mile over a front of not quite two and a half miles. Thirty Ger. officers and 1,657 men were captured and several thousand Ger. dead were counted on the field. At the time the battle was represented as a success, but the small advance achieved was disproportionate to the cost. Neuve Chapelle taught the Allies much, but the lesson was a costly one, and it was not fully learned till the later stages of the campaign.

NEUWIED (50° 26′ N., 7° 29′ E.), rown, Rhine province, Prussia, on Rhine; tobacco, sugar. Pop, 19,000.

NEVA (59° 48′ N., 30° 45′ E.), river, N. Russia, flows from Lake Ladogo into Gulf of Finland.

NEVADA (39° N., 117° W.), W. state of U.S., bounded N. by Idaho and Oregon, W. and S. by California, E. by Arizona and Utah. Except portions in N.E. and S.E., state lies wholly in Great Basin, which consists of elevated plateau, broken by rugged and lofty mountains, and intersected by ravines and wild valleys; principal ranges are E. Humboldt Mts., in E. (containing some of highest peaks), Washoe Mts (branch from Sierra Nevada), Toyabe Mts., Humboldt Mts., and White Pine Mts.; highest point is

Wheeler Peak (over 12,000 ft.), near E. boundary. Lakes are numerous and generally salt; largest, Pyramid Lake, near W. boundary; other notable lakes are Winnemucca, Carson, and Walker; hot and cold springs are frequent; sometimes valleys are watered by streams, but more often they are wide deserts with no vegetation. In S.E. are Virgin and Colorado rivers, and in extreme N. are several streams which reach ocean; rivers belonging to Great Basin never reach sea, but lose themselves in lakes or sink occasionally, to reappear farther on; longest and most important river is Humboldt, flowing into Humboldt Lake; Carson and Walker rivers enter lakes of same name. Truckee River is connected with Carson by canal.

On account of dryness of climate and aridity of soil, agriculture depends largely on irrigation; grain, hay, butter, vegetables, and fruits are produced; stock-raising is a rising industry. Nevada is, above all, a mining state, being one of richest states in mineral wealth; gold and silver principal productions, but copper, lead, zinc, iron, graphite, sulphur, gypsum, borax, and other minerals also worked; manufactures almost all in connection with mines. Nevada is one of the most thinly populated states; chief towns, Carson (cap.), Reno, and Virginia. State is represented in Congress by two senators and one representative.

Nevada formed part of Utah under name of Washoe Country until 1861, when it was organized as a territory; in 1864, was admitted as a state. Chief feature in history of state is development of mines. Railway mileage, 2,318. Area, 110,690 sq. miles, of which 869 sq. miles are water. Pop., 1920, 77,407. See Map of U. S.

NEVADA, city and county seat of Vernon co., Mo., on the Missouri Pacific and Missouri, Kansas and Texas railroads, about 100 miles S. of Kansas City. It was settled in 1830, and received a city charter in 1883. It is located in a rich agricultural and stock-raising district, while zinc and coal mines in the vicinity contribute to its prosperity. Its chief industries are foundries and railroad repair plants. The city has natural gas, an excellent water supply, electric lighting plant. and a good sewage system. There are numerous churches, good public and parochial schools, four banking institutions, and three newspapers. The city is governed by a mayor and a council of ten members. Pop., 1920, 7,139.

NEVADA, UNIVERSITY OF.— Founded at Alko, in 1873; removed to Reno and opened in 1886. It is a part of the educational system of the state, and the only institution of college grade. Besides the usual college courses, there are courses in civil, mechanical, and electrical engineering, domestic science, and agriculture. The Mackay School of Mines is endowed by Mrs. Marie Mackay, and Clarence H. Mackay, of New York. The Nevada State Normal School is under the direction of the University. The College of Agriculture provides courses in agriculture and home economics. Branch schools are maintained at Virginia City and Tonopah. There are also state laboratories of Hygiene, Pure Foods and Drugs, Soil and Water, and Agricultural Experiment Station and Veterinary Control Service. Students, 726; teachers, 62, 1922.

NEVERS (47° N., 3° 9′ E.), town, Niévre, France; gave name to counts of N. from X. cent. onwards; episcopal see, has cathedral dating in part from XI. cent.; manufactures iron goods, china, and earthenware. Pop. 28,000.

NEVIANSK, a town of Russia in the government of Perm. Pop. about 20,000.

NEVILLE, GEORGE (1432-76), *bro.* of Warwick the 'king-maker'; bp. of Exeter, 1458; abp. of York, 1464; alternately supported Henry VI. and Edward IV.

NEVILLE, WENDELL CUSHING (1870), officer of United States Marine Corps. Graduated from the U.S. Naval Academy; in 1886, appointed a naval cadet; in 1892, transferred to the U.S. Marine Corps, and commissioned a second lieutenant; promoted through the various grades, and in 1918, commissioned brigadier general (temporary); in 1901-1902, military governor of Province of Basilan; commander of a company in the Boxer Campaign, China. In World War as commander of 5th Regiment, 4th Brigade of Marines, 2nd Division. Awarded the Congressional Medal of Honor for bravery at Vera Cruz, 1914; awarded Distinguished Service Medal for distinguished services in World War.

NEVIN, ETHELBERT (1862-1901), American musical composer; *b.* in Edgeworth, Pennsylvania, November 25, 1862; *d.* in New Haven, Connecticut, February 17, 1901. He studied in Pittsburgh, and for three years in Berlin, and on his return to America opened a studio in Boston. He made some public appearances in concert, but it was as a composer that his reputation was won. The famous *Narcissus* was composed at 13; and *Oh That we Two Were Maying* at 14; the *Cradle Song* and *Night in Venice* were adult compositions. See Thompson's *Life of Ethelbert Nevin.*

NEVIN, GEORGE BALCH (1859), composer. Educated at Cumberland Valley State Normal School, and had two years at Lafayette College. Wrote many cantatas; among them, *The Adoration and the Crucified* (an anthem for Christmas); *Arise Shine for Thy Light is Come*; four part songs, *It was a Lover and his Lass, O Mistress Mine, My Bonnie Lass she Smileth, Smile Again my Bonny Lassie, O Little Mother of Mine*; songs, *In that Day shall this Song be Sung, Ye Flanders Dead, Once More the Twilight Glow, Ring Out, Wild Bells, Sing and Rejoice, Rest in Peace, When the Kye Come Hame.*

NEVINSON, HENRY WOOD, Brit. journalist and war correspondent; for *Manchester Guardian*, in India, 1907-08; for *Daily News*, in Morocco, 1909; for *Daily Chronicle*, in Bulgaria, 1912, Albania, 1913, Berlin, 1914; for *Manchester, Guardian* (accredited War Office), Dardanelles, 1915, Salonica and Egypt, 1916, France and Germany, 1919; pub. *Neighbors of Ours, 1895*; *The Plea of Pan, 1901*; *The Bawn in Russia, 1906*; *The New Spirit in India, 1908*; *Essays in Rebellion, 1913*; *The Dardanelles Campaign, 1918.*

NEVIS (17° 8′ N., 62° 35′ W.), island, Leeward group, Brit. W. Indies; mountainous; exports sugar. Pop. 13,000. Capital, Charlestown.

NEVYANSKIY ZAVOD (57° 30′ N., 60° 31′ E.), town, Perm, Russia; iron-and steel-works. Pop. 16,500.

NEW, HARRY STEWART (1858), U. S. senator; *b.* at Indianapolis, Id.; *s.* of John C. and Melissa B. New. He was educated at Butler University. After being with the *Indianapolis Journal* successively as a reporter, editor, publisher, and part owner, from 1878-1903, he was president of the Bedford Stone and Construction Co. for several years. He was also a member of the Indiana Senate from 1896-1900, and from then until 1912, was a member of the Republican National Committee, of which he was chairman during 1907-08. He was also a delegate to several Republican National Conventions, after which he was elected U.S. Senator for the term of 1917-23. He was defeated for renomination in 1922 and was appointed Post Master General in 1923.

NEW ALBANY, city and county seat of Floyd co., Ind., on the Ohio River, about 110 miles S. of Indianapolis. It is served by the Chicago, Indianapolis and Louisville, Baltimore and Ohio Southwestern, and Pittsburgh, Cincinnati, Chicago and St. Louis railroads. It was incorporated as a city, in 1839. Water power derived from the falls of the Ohio River has helped to make the city an important industrial center. Its chief manufacturing plants are tanneries, engine and boiler works, furniture factories, flour, lumber, rolling and planing mills. It does a large shipping business both by water and rail. It has many handsome buildings, including the City Hall, County Court House, Post Office, Roman Catholic Academies, and church edifices. There are good public and parochial schools, five banking institutions, and four newspapers and periodicals. The city is governed by a mayor, elected for four years, and a council. Pop., 1920, 22,992.

NEW AMSTERDAM, the original name of New York City, given it by the Dutch. Henry Hudson, having sailed up the Hudson as far as the present site of Albany, described the country on his return to Holland. The West India Company was then chartered, and, in 1623, began sending out colonists. Settlements were made in various parts of the territory, including Manhattan Island, but it was not till 1626 that Peter Minuit, Governor of New Netherland, as the colony as a whole was named, founded New Amsterdam on Manhattan Island, which he bought from the Indians for trinkets worth about $25.00. Thenceforward the administrative headquarters of the colony were established here. Standing at the mouth of the river, New Amsterdam became the chief port and the center in the important fur trade which was being built up with the Indians in the interior. The easy-going religious tolerance of the Dutch also caused the town to become the refuge of many foreigners fleeing from religious persecution, especially from the New England colonies. It was said that, in 1643, eighteen languages were spoken in New Amsterdam. Unfortunately for themselves, the Dutch were traders rather than settlers, in the agricultural sense, and when the English fleet appeared, in 1664, and demanded the surrender of the colony, Governor Stuyvesant found himself unable to rouse the spirit of resistance in so cosmopolitan a population. At this time the population of New Amsterdam was about 1,500, and of the entire colony, about 7,000.

NEW AMSTERDAM (6° 8′ N., 57° 24′ W.), town, near mouth of Berbice, Brit. Guiana, S. America. Pop. 9,300.

NEWARK, city and county seat of Essex co., New Jersey, on the Passaic River and Newark Bay, eight miles from New York City. It is the metropolis of the state and the 15th city in the United States in population. It has an area of 23.40 sq. miles, and a wharf frontage of ten and one-half miles. It is served by

the Pennsylvania, Lackawanna, Lehigh Valley, Erie, and Central of New Jersey railways, while hundreds of electric railway trains daily connect it with New York. The city ranks first in the Union in the diversity of its industries, and the value of its manufactures, as compared to its per capita population. Its leading industries are leather, smelting and refining of metals, foundry and machine shop products, jewelry, paints, oils, and varnishes, electrical machinery and apparatus, chemicals, locomotives, upholsterings and carriages. The city is adorned with numerous handsome public and private buildings. There are 20 city parks, and five county parks within the limits of the city, having an area of 662 acres. The Prudential and Mutual Benefit Life Insurance Companies, two of the largest in the U.S., are located in Newark. There are about 200 churches, 62 charitable organizations, 12 hospitals, 5 orphan asylums, and over 700 societies engaged in social welfare work. There are 70 public schools and a large number of high schools, business colleges, academies, and specialized institutions. The free public library has over 250,000 volumes, and the library of the New Jersey Historical Society is noted for the completeness of its collection on historical subjects. There are 40 banking institutions, and 25 newspapers and periodicals. The city is operated under a commission form of government. Pop., 1920, 414,524.

NEWARK, village of New York, in Wayne co., about 30 miles S.W. of Rochester, located on the New York Barge Canal, and served by the Pennsylvania, West Shore, and New York Central railroads. It was settled in 1820, and incorporated as a village in 1825. Surrounded by a fertile agricultural region, of which it is the natural market and shipping point, it carries on an extensive trade in fruit, dairy and farm products. Its chief industries are tinware, glass, paper boxes, and canneries. It has good schools, churches, a public library, two banks, and two newspapers. The waterworks are owned by the village. Pop., 1920, 6,964.

NEWARK, city of Ohio, and county seat of Licking co., about 30 miles N.W. of Columbus, located on the Licking River and the Ohio Canal. It is served by the Pennsylvania and the Baltimore and Ohio railroads. Its settlement dates back to 1802. It is the center of a rich agricultural region, and the proximity of sandstone quarries and coal fields has helped to make it an important industrial city. Its chief manufactures are electric cars, stoves, locomotives, flour, lumber, and machine shop products, chemical instruments, glassware, bottles, and carriages. There are 28 churches, excellent elementary and high schools, five banks, and three newspapers. Denison University is locate there. Pop., 1920, 26,718.

NEWARK-UPON-TRENT (53° 4′ N., 0° 49′ W.), town, Nottinghamshire, England; has ruined castle, which stood three sieges during Civil War; important agricultural center, manufactures iron and brass goods, beer, flour. Pop., 1921, 16,957.

NEWARK, DAVID LESLIE, LORD (1601-82), Scot. general; commanded for Parliament at *Marston Moor*, 1644; defeated Montrose at *Philiphaugh*, 1645; clung to Presbyterianism, and supported Charles II.; captured at *Worcester*; baron, 1661.

NEW BEDFORD, city and one of the county seats of Bristol co., Mass., located on the Acushnet River and Buzzard's Bay, 56 miles S. of Boston. It is served by the New York, New Haven and Hartford railroad, and has an extensive system of traction lines that connect it with many important industrial centers. It has an area of 20 sq. miles, and is the fifth largest city of the state in point of population. The city ranks first in the U.S. in the manufacturing of fine cotton goods and yarns. Apart from the cotton mills that employ about 40,000 persons, there are important twist-drill plants, rope factories, cut-glass works, shoe factories, and copper-rolling mills. The city has 36,800 feet of water frontage, and great wharf projects now in process of development will make it one of the most important shipping terminals in the country. The park system embraces 222 acres. The city has many fine public and private buildings, and a fine system of roads, excellently maintained. The public library has about 180,000 volumes. New Bedford was formerly a famous whaling center, and its museums and library are noted for their collection of prints and relics bearing on the industry. There are numerous churches, 36 public and two parochial schools, eight banking institutions, and eight newspapers and periodicals. The city was first settled in 1652, and received a city charter in 1847. Many noted events Revolutionary times took place in and near the city. Pop., 1920, 121,217.

NEWBERN, city of North Carolina, and county seat of Craven co., on the Neuse and Trent Rivers, about 100 miles S.E. of Raleigh. It is served by the Atlantic Coast Line, and Norfolk-Southern railroads. A city charter was granted to it in 1723. It has an excellent harbor and is an important seaport. Its chief manufacturing establishments are

knitting mills, shipyards, fertilizing plants, canning factories, turpentine distilleries, shingle, lumber, planing and grist mills. It carries on an extensive export trade, both by water and rail. The city is attractively laid out, and has a number of handsome public and private buildings. There are 12 churches, excellent schools for white and colored pupils, four banking institutions, and four newspapers. The city is governed by a mayor, a board of aldermen and a council of 12 members. Newbern was the center of important military and naval operations during the Civil War. Pop., 1920, 12,198.

NEWBERRY, city of North Carolina, and county seat of Newberry co., 40 miles N.W. of Columbia, and served by the Atlantic Coast Line, and Southern railroads. Located in a cotton growing region, most of its business is concerned with that staple and its by-products, such as cotton-seed oil and cotton goods. In addition, it manufactures coffins, lumber products, and fertilizers. Newberry Lutheran College is located there, and there are good schools, numerous churches, three banks, and three newspapers and periodicals. The waterworks and electric-lighting plant are municipally owned. City affairs are administered by a mayor and a unicameral council. Pop., 1920, 5,894.

NEWBERRY, TRUMAN HANDY (1864), American naval officer and financier; *b.* in Detroit, Michigan, November 5, 1864. Graduating from Yale, in 1885, he became connected with railroads, and was an organizer of the Michigan State Naval Brigade, serving as a landsman in 1895, and lieutenant and navigator, 1897-1898. In the Spanish-American War he was on the *Yosemite* when it attacked the Spanish ammunition-ship, *Antonio Lopez.* In 1891, he was appointed colonel and aid-de-camp to the Governor of Michigan; Assistant-secretary of the Navy, 1905-1908; and succeeded Secretary Metcalfe, from December, 1908, to March, 1909; Commander of U.S. Naval Reserve in World War; Chief assistant of commander of 3rd Naval District. In 1918, he was elected to the United States Senate, defeating Henry Ford. The expenditure of over $200,000 in the primaries, led to accusation for corruption. He was tried and convicted, but the case was dismissed by the United States Supreme Court. Charges brought in the senate were tried by the Committee on Privileges and Elections, and Mr. Newberry was exonerated. He resigned his seat, however, in 1922.

NEWBILL, WILLARD DOUGLAS (1874), army officer; *b.* in Virginia. In 1897, graduated from the United States Military Academy; commissioned second lieutenant, in 1897, and rose through the various grades to colonel, 1917; served in Spanish-American War from 1898-1899; 1899-1901, in Philippine Islands; also served on the Mexican Border; at Vicksburg Military Park, in charge of reunion of Blue and Gray, in 1917; in World War as commander of 3rd Field Artillery, American Expeditionary Forces, France, 1918-1919; was in the last Meuse-Argonne offensive.

NEWBOLT, SIR HENRY JOHN (1862), Eng. poet and journalist; ed. *Monthly Review, 1900-4*; has written stirring patriotic verse, such as *Drake's Drum*; *Death of Admiral Blake,* much of which has been set to music; pub. poetical collections, *Admirals All, 1897*; *The Island Race, 1898*; *Songs of the Sea, 1904*; *Songs of the Fleet, 1910*; tragedy, *Modred*; novels, *The Old Country, 1906*; *The New June, 1909*; also *The Year of Trafalgar, 1905*; *Tales of the Great War, 1916*; *Book of the Happy Warrior, 1917*; *Book of the Long Trail, 1919*; also *Book of Good Hunting, 1920.*

NEW BRIGHTON, borough in Beaver co., Pa., on Beaver River, 28 miles N.W. of Pittsburgh, and served by the Pennsylvania, and the Pittsburgh and Lake Erie railroads. It was settled in 1789, and incorporated as a borough, in 1838. There are coal mines and clay beds in the immediate vicinity, and the greater part of its trade and industry are connected with these products. In addition, it has many manufactories, chief of which are flour mills, coffee mills, glass plants, nail factories, sewer-pipe works, twine factories, potteries, and brass-casting plants. Excellent water power is furnished by the Beaver River. There are numerous churches, a public library, art gallery, good schools, three banks, and a newspaper. The borough is governed by a burgess and a council of 12 members. Pop., 1920, 9,361.

NEW BRIGHTON, a former city of New York, on the east shore of Staten Island. It is now a part of the Borough of Richmond, Greater New York. It contains Sailors Snug Harbor and is a residence place for business men of New York City.

NEW BRITAIN, largest isl. in New Britain Archipelago, W. Pacific (5° 3′ S., 150° 6′ E.); mountainous, with dense, rich vegetation; unhealthy climate; highest peak, 'The Father,' 7,500 ft.; interior almost unknown; Gazelle Peninsula, in N., well developed; cocoa-nuts;

in 1884, the island became part of German Protectorate, and from 1885 till 1914, was called Neu-Pommern (New Pomerania). During World War, captured by Naval Reserve of Australian Expeditionary Force, Sept. 11, 1914. Length, 300 m.; breadth, 50 m.; area, 10,000 sq. m. Pop. 50,000 (600 Europeans, 1,200 Chinese).

NEW BRITAIN, city in Hartford co., Conn., on the New York, New Haven and Hartford railroad. It was settled in 1687, and received a city charter in 1871. Its industries are many and varied, and it ranks as one of the most important manufacturing centers in the state. Its chief industrial establishments are those engaged in making knit goods, hosiery, hardware, stamped ware, and foundry and machine shop products. Besides the State Normal School and the New Britain tain Institute, it has excellent public and parochial schools, a high school and a pre-vocational grammar school. There are numerous churches housed in handsome edifices, seven banking institutions, and five newspapers and periodicals. Its park system comprises about 234 acres. The waterworks are owned and operated by the city. The government is vested in a mayor, elected for two years, and a council. Pop., 1920, 59,316.

NEW BRUNSWICK (46° 30′ N., 66° W.), mar. prov. of Dominion of Canada, bounded by Quebec, Gulf of St. Lawrence, N.; Maine and Quebec, W.; Bay of Fundy, S; Nova Scotia, Gulf of St. Lawrence, E. Connected with Nova Scotia by narrow isthmus; seaboard, about 600 miles., has excellent harbors; extensive forests; St. John and other navigable rivers; surface undulating, and diversified by numerous small lakes; principal towns, Fredericton (cap.), St. John, Moncton. Coal is mined; limestone, antimony, and gypsum quarried; rich in oil and natural gas; valuable fisheries; timber exported; manufactures cotton and woolen goods, paper, machinery, sugar. French settlement began, 1604; first Brit. settlement, 1764; region ceded to Britain as part of Acadia, 1713; became separate colony, 1784; great influx of Amer. Loyalists; joined the Dominion, 1867. New Brunswick has a lieut.-gov., executive council, and legislative chamber; Provincial Univ. at Fredericton. Area, 27,985 sq. miles. Pop., 1921, 388,100. See Map of Canada.

NEW BRUNSWICK, a city of New Jersey, in Middlesex co. It is on the Pennsylvania Railroad and on the Raritan river, and the Delaware and Raritan canal. Its industries include the manufacture of hoisery, carpets, wall paper, rubber goods, etc. It is the seat of Rutgers College and several other educational institutions. Pop., 1920, 32,779.

NEWBURGH (56° 22′ N., 3° 14′ W.), seaport, Fifeshire, Scotland, on Firth of Tay; linens.

NEWBURGH, a city in New York, in in Orange co., on the W. bank of Hudson River, 58 miles N. of New York City; served by the West Shore, and Erie railroads. The settlement of the city dates back to 1708, and the place was prominent in Colonial times and during the Revolutionary War. It had acquired quite considerable importance as a distributing point for the agricultural district back of it in the early part of the XVIII. cent. In addition, it was a shipbuilding center, and at one time was quite extensively engaged in the whaling industry. It is noted as having been Washington's headquarters, 1782-83, and the house in which the latter lived is still preserved and serves as a historical museum. Newburgh was given a city charter in 1865. The city is beautifully located on a high plateau, 310 feet above the river; has handsome streets and buildings, and commands a magnificent view of the Hudson. It has an extensive commerce and its industries are large and varied. Its chief manufactures are cotton and woolen goods, hats, furniture, leatherette, carpets, springs, flour, lumber, foundry and machine shop products. Its educational system is excellent and there are good public and parochial schools besides three academies. There are 25 churches, six banking institutions, and seven daily and weekly newspapers and periodicals. The government consists of a mayor and four councilmen, who select a city manager in whom resides the executive power. The waterworks are municipally owned. Pop., 1920, 30,366.

NEWBURN (54° 58′ N., 1° 44′ W.), town, Northumberland, England. Pop. 18,000.

NEWBURY (51° 55′ N., 1° 20′ W.), market town and municipal borough, Berkshire, England, on river Kennet; large agricultural trade; breweries and flour-mills. Pop., 1921, 12,290.

NEWBURYPORT, a city of Massachusetts, and one of the county seats of Essex co., located on the Merrimac River and the Boston and Maine Railroad. In the days of the old clipper ships, Newburyport was famous for its shipbuilding industry. The city was settled in 1635, and received a city charter in 1851. The leading industrial establishments are boot and shoe factories, cotton mills, hat fac-

tories, comb factories, silver factories, and foundries. There is a considerable coastwise trade in coal. It has many notable buildings, many of them with historical associations. It was the birthplace of William Lloyd Garrison, and the burial place of George Whitfield. There are good schools, churches, five banks, and two newspapers. The waterworks are owned and operated by the city. Pop., 1920, 15,618.

NEW CALEDONIA, LA NOUVELLE CALEDONIE (21° S., 165° E.), island, belonging to France, in South Pacific; length, 250 miles; breadth, about 25 miles; area, 7,650 sq. miles; surface mountainous. Nouméa, capital, N.C. was discovered by Cook, 1774; annexed by France, 1853; used as penal settlement. Dependencies of N.C. are Isle of Pines, Wallis Archipelago, Loyalty Islands, Huon Islands; Futuna and Alafi annexed by France, 1888. Pop. 50,680, including some 29,000 blacks, several thousand convice settlers.

NEWCASTLE.—(1) (54° 12′ N,. 5° 54′ W.), watering-place, on Dundrum Bay, County Down, Ireland. (2) (32° 57′ S., 151° 44′ E.), port, N.S. Wales, Australia; great center of coal trade; shipbuilding, foundries, copper-works, manufacture of boots and shoes; has cathedral. Pop., 1920, 62,900.

NEWCASTLE, a town of Indiana, and county seat of Henry co., on the Blue River, about 45 miles N.E. of Indianapolis. It is served by the Lake Erie and Western, Pittsburgh, Cincinnati, Chicago and St. Louis, and the Cleveland, Cincinnati, Chicago and St. Louis railroads. It is the center and shipping point of a rich agricultural region. Its chief industries are automobiles, caskets, scales, pianos, brass furniture, carriages, lathes, bridges, flour, paper boxes, agricultural implements, and iron and steel products. Natural gas, fine water power and unusually good transportation facilities contribute to its prosperity. The electric lighting system and waterworks are controlled by the city. There are numerous churches, good schools, four banks, and three newspapers. Pop., 1920, 14,458.

NEWCASTLE, a city of Pennsylvania, and county seat of Lawrence co., on the Beaver River; served by the Baltimore and Ohio, Pennsylvania, Erie, Pittsburgh and Lake Erie, and the Buffalo and Pittsburgh railroads. It is the market and shipping point of a productive agricultural region, and does a large trade in dairy and farm products. In the vicinity of the city are large iron ore, coal, limestone, and clay beds. Its chief industries are tin plate mills, car shops, blast furnaces, steel and rolling mills, hosiery, paints, boilers, rubber tires, and amchinery. There are many notable public and private buildings, including the U.S. Government Building, the Y.M.C.A. building, and the Shenango Valley Hospital. There are 35 churches, excellent public and parochial schools, ten banking institutions, and three newspapers. The city is under the commission form of government. Pop., 1920, 44,938.

NEWCASTLE-ON-TYNE (54° 58′ N., 1° 37′ W.), city, co. of a city, munic. and parl. bor. and port, Northumberland, England, on N. bank of Tyne; ancient and historic town, now one of chief commerical centers in England, owing to mineral products in vicinity and great industrial activity; connected by bridges with Gateshead, on opposite bank of river. Shipbuilding is main industry; important trade, coal being chief export; its manufactures include iron, steel (Elswick Works), machinery, glass, earthenware, chemicals, etc. Newcastle was scene of many struggles with Scots. Pop., 1921, 274,955.

NEWCASTLE-UNDER-LYME (53° 2′ N., 2° 14′ W.), town, Staffordshire, England; center of coal mines and potteries; manufactures paper, army clothing. Pop., 1921, 20,418.

NEW-CHWANG, OR NUI-CHWANG, a treaty port in S. Manchuria, China. The town proper stands on the Liao R., 40 m. from the coast, but the name is usually applied to the port, 30 m. nearer the coast of the Gulf of Lao-tung, which was originally called Muh-kow-ying. The Liao R. is here about one-half m. wide, but the port is ice-bound in winter. The surrounding country is flat and marshy. The chief industry is the manufacture of bean oil and bean cake, which form the chief exports, with raw beans, ginseng, and raw silk. There are gold, iron, and silver mines. Pop. 50,000.

NEWCOMB, SIMON (1835-1909), American astronomer; *b.* in Wallace Nova Scotia, March 12, 1835; *d.* at Washington, D.C., July 11, 1909. He came to the United States in 1853, and computed the *Nautical Almanac,* Cambridge, 1855, graduating from the Lawrence Scientific School, Harvard, in 1858. Professor of mathematics in the navy, 1861, and assigned to the Naval Observatory. Secretary of the Transit of Venus Commission, 1871-1882; senior professor of mathematics and computor of *Nautical Almanac,* 1877-1897. Retired from active service in the navy, in 1897. Professor at Johns Hopkins, 1884-1894; editor the *American Journal of Mathematics.* He wrote many important

scientific works, among them *Researches in the Mountains of the Moon, 1876*; *Tables of Uranus, Measure of Velocity of Light, 1884*. Edited the *Astronomical Papers of the American Ephemeris*. Popular writings include *Popular Astronomy, The Stars, 1901*; *Astronomy for Everybody, Reminiscences of an Astronomer, 1903*. Congress made him a rear-admiral in 1906, and he was given a military funeral.

NEWELL, FREDERICK HAYNES (1862), a consulting engineer in the U.S. Reclamation Service; *b.* at Bradford, Pa.; *s.* of Augustus William and Anna M. Haynes Newell. He was educated at the Massachusetts Inst. Tech. After being engaged in mining in Colorado and later in miscellaneous engineering in Pennsylvania, he was with the U.S. Geol. Survey, from 1888 to 1902, and then became connected with the U.S. Reclamation Service, at Washington, D.C., of which he was made consulting engineer, in 1914. Author of *Agriculture by Irrigation, 1894*; *The Public Lands of the United States, 1895*; *Irrigation in the United States, 1902*; *Hawaii, its Natural Resources, 1909*; *Principles of Irrigation Engineering, 1913*; *Irrigation Management*, and *Engineering as a Career, 1916*; and *Water Recourses, Present and Future Uses, 1919*.

NEWELL, PETER, (SHEAF HERSEY), (1862), an American author and illustrator; *b.* at McDonough co., Ill.; *s.* of George Frederick and Louisa Newell. He was educated at Bushnell, Ill., until he was about 17 years of age. Author of *Topsys and Turveys, 1893*; *Topsys and and Turveys (No. 2), 1894*; *A Shadow Show, 1896*; *Peter Newell's Pictures and Rythms, 1899*; *The Hole Book, 1908*; *Jingle Jangle, 1909*; *The Slant Book, 1910*; and *The Rocket Book, 1912*. He also contributed to various magazines and illustrated several books.

NEWELL, ROBERT HENRY, (ORPHEUS C. KERR), (1836-1901), American humorist. He was *b.* in New York, and little is known of his life but what is found in his writings. His pen name, Orpheus C. Kerr, is derived from 'Office Seeker.' He wrote for newspapers and periodicals letters, sketches, romances and verse. His work won the favor of Abraham Lincoln. Four volumes of his letters were published in 1862-1868.

NEWELL, WILMON (1878), Entomologist; *b.* in Hull, Iowa. In 1897, graduated from Iowa State College; from 1897-1899, the assistant entomologist at Iowa Agricultural Experiment Station, and at the Ohio Agricultural Experiment Station, from 1899-1902. At Texas Agricultural Experiment Station, 1902, as assistant entomologist and apairist; in 1903-1904, state entomologist of Georgia; state entomologist, and entomologist of the Texas Agricultural Experiment Station, from 1910-1915; since 1915, plant commissioner of Florida State Plant Board; dean of the College of Agriculture, and director of the Experiment Station and agricultural extension division, since 1921, of the University of Florida.

NEW ENGLAND, name given to six states in N.E. of U.S., consisting of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. Region was named New England by Captain Smith, 1614; first successful settlement was made at Plymouth, 1620; colonized by Puritans from England; supported the Federal cause during the Amer. Civil War. Area, *c.* 66,000 sq. miles.

NEW FOREST (*c.* 50° 50′ N., 1° 38′ W.), district, Hampshire, England, W. of Southampton Water; well wooded, beautiful scenery; greater part is Crown property; chief village is Lyndhurst, near the center.

NEWFOUNDLAND (46° 37′-51° 37′ N., 52° 44′-59° 30′ W.), island, and Brit. colony (which has so far refused to join Dominion of Canada), N. America; lies off the mouth of the St. Lawrence, and is separated from Labrador by Strait of Belle Isle (11 m. wide), while distance to Cape Breton I. on S.W. is little over 50 miles. Its shape is roughly triangular. Coast-line is much broken and surface is rugged; interior is a low plateau. Chief towns, St. Johns (cap.), Harbor Grace. There are innumerable lakes, about one-third of surface being water; largest lakes, Grand and Red Indian. Climate milder than that of Canada; fogs are frequent on coasts. Spruce and pine forests are found in various parts; seaboard and river valleys are under cultivation, but over 90 per cent of adult pop. are engaged in fishing, fisheries being staple resource of colony. Of these, most important is cod fishing, season of which is from May till November; seal, lobster, salmon, and herring fishing are also productive. Chilled fish is a new development of export trade. There is also a considerable lumber trade; pulp and paper mills have been recently established. Minerals include copper (at Little Bay, *c.* 200 m. from St. John's), iron, asbestos, lead, coal, silver, gold. Railway mileage, 841.

Newfoundland, the smallest of the self-governing Dominions of the Brit. Empire, is administered by a governor, assisted by executive council; legislative

power vested in two houses—assembly of 36 members, elected by popular vote; and legislative council of 24 members, appointed by governor. Education is free and compulsory. Labrador is a dependency.

The history of Newfoundland dates from its discovery, in 1479, by Cabot; it was subsequently visited by Cortereal, a Port. explorer, and soon afterwards became known as a great fishing place, expeditions being sent annually by Portugal, France, and Britain, in search of fish. In 1583, a colonizing expedition to the isl. was led by Sir Humphrey Gilbert, who definitely annexed it for England. Other expeditions were undertaken during reign of James I., and a settlement called Avalon was founded by Lord Baltimore in the S.E., which he afterwards withdrew owing to Fr. interference. For a considerable time disputes between French and English for the ownership of Newfoundland and its valuable fisheries were carried on, but eventually these were ended by the Treaty of Utrecht, 1713, whereby Britain obtained exclusive possession of the island, while the French were granted certain fishery rights along the N. and W. coasts (the '*French Shore*'); Britain's exclusive sovereignty was confirmed by subsequent treaties, in 1763 and 1783; in 1855 the island obtained responsible government. Later in the XIX. cent. further disputes arose, and in 1898, a Royal Commission was appointed to investigate the matter. In 1904, the whole question was finally settled by a convention of both nations, the French keeping the right to fish equally with the British, but renouncing all claim to exclusive rights. A dispute with U.S. on the fishing question was settled, in 1910, by the Arbitration Tribunal at the Hague. 'American inhabitants are entitled to fish in the bays, creeks, and harbors of the treaty coasts of Newfoundland and the Magdalen Islands.' The colony contributed 11,922 men to the Brit. armies during the Great War; these forces had a splendid record. In addition, 3,000 Newfoundlanders joined other Allied forces. Area, 42,750 sq. miles (Labrador, 120,000 sq. m.). Pop. 263,700 (Labrador 3,650). See Map of Canada.

NEWFOUNDLAND DOGS. See Dog Family.

NEWGATE PRISON, a former prison in London, situated at the W. end of Newgate Street, opposite the Old Bailey. It was begun in the reign of Henry I., and is mentioned as a prison in 1207. In 1241 a sum of 20,000 marks was exacted from wealthy Jews of London to repair the structure. In the XV. cent. funds for its rebuilding were left by the will of Sir Richard Whittington. It was destroyed in the great fire of 1666, but rebuilt about 1770. It suffered much damage by fire during the No-Popery riots of 1780, when 300 prisoners were let loose. (See *Barnaby Rudge.*) Mrs. Fry began her labors for the improvement of the condition of prisoners there in 1808, and it ceased to be used as a debtors' prison in 1815 and as a place of incarceration in 1877. Executions took place within it after 1868. In 1904 it was demolished, and the site is now occupied by the Middlesex Session House. The noted prisoners who have been confined in it include George Wilkes, Daniel Defoe, Jack Sheppard, Titus Oates, and William Penn.

NEW GLASGOW (45° 36′ N., 62° 40′ W.), seaport, on East River, Nova Scotia, Canada; iron and steel works, colleries. Pop., 1921, 8,959.

NEW GUINEA (0° 25′-11° 40′ S., 130° 50′-154° 35′ E.), second largest isl. in the world, N. of Australia in W. Pacific; separated from Queensland by Torres Strait; Arafura Sea in S.W.; length about 1,500 m.; breadth, 480 m.; area, *c.* 312,000 sq. m. West part belongs to Holland, rest to Britain. Northern part is almost separated from mainland by MacCluer Inlet; Western half and interior still mostly unexplored. New Guinea is traversed by high mountain ranges (Owen Stanley, with Mt. Victoria, 13,000 ft., in S.E.; Charles-Louis, in central region, over 14,000 ft.; Finisterre, 11,000 ft., in N.); extensive forests, coast much indented; fine harbors. Climate is unhealthy. There are numerous beautiful birds (*e.g.*, bird of paradise); mammals scanty. Chief rivers are Amberno, Fly, Kaiserin Augusta, Mambare; chief exports are copra, india-rubber, sago, coffee, cocoa. Island is inhabited by Papauans mixed with Malays and Polynesians; notorious for head-hunting and savage tribes. New Guinea was sighted by d'Abreu, 1511; name given by Retez, 1546; settlement made by East Indian Co., 1793; Dutch annexed W. half, 1828, the remainder divided between Britain and Germany, 1884; German New Guinea conquered by Australian forces, 1914, and now under British (islands S. of equator) and Japanese (islands N. of equator) governments. Pop. *c.* 750,000. See Map of E. Indies.

NEW GUINEA, BRITISH, named territory of Papua, 1906; includes D'Entrecasteaux, Louisade, and other small islands; area, *c.* 90,540 sq. m.; Commonwealth of Australia assumed control, 1901; administered by lieut.-gov. and legislative council; cap., Port Moresby. Gold mining is important; great petrol-

eum wells discovered, 1919; chief exports: timber, rubber, pearls, gold, bêche-de-mer, copra, and various tropical products. Pop. 251,000.

NEW GUINEA, GERMAN, formerly included Kaiser Wilhelm's Land (area, 70,000 sq. m.), Bismarck Archipelago, Marshall, Solomon, Caroline, Ladrone (except Guam), and Nauru Islands. Australia was given a mandate in 1919. Chief products are copra, gold, timber, mother-of-pearl, coffee, sandal-wood, and tortoise-shell. Pop. 360,000.

NEW GUINEA, DUTCH, has never been wholly explored. A few trading and mission stations. Area, 151,789 sq. miles. Pop. 220,000. See Map of E. Indies.

NEWHALL, CHARLES STEDMAN (1842), author; *b.* in Boston, Mass. A corporal in the Civil War in the 45th Massachusetts Infantry. Graduated from Amherst College in 1869. In the Congregational ministry from 1872-1888; was a superintendent of forest reserves of Northern and Central California and United States assistant special forest agent. Author of *History of Fall River, Massachusetts, 1862*; *Joe and the Howards, 1869*; *Harry's Trip to the Orient, 1885*; *Ruthie's Story, 1888*; *Trees of Northeastern America, 1893*; *Vines of Northeastern America, 1897.* Wrote *Sheep and the United States Reserves, 1901*; *Fire and the United States Reserves, 1902*; *Lumbering and the United States Reserves, 1905.*

NEW HAMPSHIRE (44° N., 71° 30′ W.), N. Atlantic state of U.S.; one of the New England States; bounded N. by Quebec, W. by Vermont, S. by Massachusetts, E. by Maine and Atlantic Ocean; length, 178 m.; breadth, 88 m.; area—land surface, 9,341 sq. m., water surface, 310 sq. m.

Surface is mountainous, except in S.E.; White Mts. in N. consist of several ranges—viz. Presidential, with Mt. Washington (6,293 ft.), Adams (5,805 ft.), Jefferson (5,725 ft.), Clay (5,554 ft.), Madison (5,380 ft.), etc. Franconia range, with Mt. Lafayette (5,028 ft.); Carter Moriah range, with Carter Dome (4,860 ft), etc. Principal rivers are Connecticut, Piscataqua, Merrimac, Androscoggin, many fine waterfalls; numerous lakes with fine scenery (Winnepesaukee, New Found, Sunapee, Umbagog, Squam, Massabesic, etc.). Climate is healthy, with severe winters. Fauna includes wolf, lynx, raccoon, squirrel, deer, fox, sable, mink, porcupine, numerous song-birds (wren, hermit-thrush, bunting, etc.). There are extensive forests of beech, oak, yellow birch, sugar-maple, etc. Principal products are hay, corn, potatoes, oats, fruit (especially apples), tobacco, timber; important manufactures are cotton and woolen goods, boots and shoes, lumber, machinery, flour, paper; granite and mica are quarried.

All territory between 40° and 48° N. lat. was granted to Council for New England by James I., 1620; first settlement made by John Mason, 1623, followed by various others up to 1635. New Hampshire was annexed by Massachusetts *c.* 1641; constituted a separate province, 1679; formed part of the Dominion of New England from 1686 to 1689; again united to Massachusetts, 1689; royal government established *c.* 1692; boundaries definitely fixed, 1737, 1741, 1764; took an active part in the War of Independence; one of original thirteen states of the Union.

New Hampshire has a governor, senate (24 members, elected for two years),and house of representatives (390-400 members); two senators and two representatives in Federal Congress. The state is divided into ten counties. Principal towns are Manchester, Nashua, Concord (cap.), Dover, Portsmouth, Berlin, Keene. Elementary education is compulsory; St. Anselm's Coll. (Manchester), Dartmouth Coll. (Hanover), New Hampshire Coll. of Agriculture and Mechanic Arts (Durham), besides other colleges. Total railway mileage exceeds 1,300. Pop., 1920, 443,083. See Map of U. S.

NEW HAMPSHIRE COLLEGE.—Opened in 1867, at Durham, New Hampshire. It provides a four-years' course in agriculture, mechanical and electrical engineering, technical chemistry, and general science. There is also a two-years' course in agriculture, and ten-weeks' winter course in agriculture and dairying. The college has a preparatory department, and department of education. A State Experimental Station is connected with the college. Women are admitted to all courses. The income is derived from the Federal Grant of 1862, and state appropriations. Students, 973; teachers, 106, 1922.

NEW HAVEN, a city of Connecticut, and county seat of New Haven co. It is located on New Haven Bay, by which it has connection with Long Island Sound, and is served by the New York, New Haven and Hartford Railroad. The city is popularly referred to as the 'City of Elms,' because of the stately elm trees that border its streets and avenues. It is the largest city in the state; covers an area of 23 square miles, and is beautifully laid out, with a total of 225 miles of streets and boulevards. It is the natural market and distributing center of

the most important section of the state. Its chief industries are hardware, firearms, ammunition, wagons, watches, clocks, automobiles, rubber goods, canneries, foundries, and machine shop products. It is the seat of Yale College, and the activities of that institution form an important part of the city's life. Other noted buildings and institutions are the State Normal School, Art School, Boardman Manual Training School, Peabody Museum, the University Library of over 1,000,000 volumes, the Public Library with 120,000 volumes, the New Haven Orphan Asylum, and many other agencies devoted to social and civic welfare. The park system embraces nearly 1,200 acres. There are numerous churches, housed in imposing buildings, about 60 public schools, 32 banking institutions, and 29 newspapers and periodicals. The city has played an important part in American history since the early Colonial times. It was first settled in 1638, and was incorporated as a city in 1784. From 1701 until 1874, it was joint capital with Hartford of Connecticut. The government is vested in a mayor, elected every two years, and a board of aldermen, of 21 members. **Pop.**, 1920, 162,537.

NEWHAVEN (50° 47′ N., 0° 2′ E.), seaport, Sussex, England, on Eng. Channel; terminus of Newhaven-Dieppe channel route; coasting trade. Pop. 7,000.

NEW HEBRIDES, chain of islands in W. Pacific Ocean, largest being Espiritu Santo, Mallicolo, Erromango, Efaté or Sandwich, Ambrym, Tanna, and Aneitum; islands are mostly lofty and volcanic, with luxuriant vegetation; jointly administered (since 1906), by Brit. and Fr. High Commissioners; seat of government at Port Vila in Efaté Island; inhabited by native Melanesians, British, and French; sighted *c.* 1603; explored and named by Cook, in 1774. Leading exports are coffee, copra, maize, bananas, and timber. Pop. 60,000.

NEW HOLLAND, former name of Australia.

NEW IBERIA, town and parish seat of Iberia Parish, La., on Bayou Teche, about 100 miles W. of New Orleans; served by the Southern Pacific Railroad. It is in the heart of a fertile agricultural region, and does an extensive business in the shipping of corn, rice, sugar cane, cotton, vegetables, berries, and pepper. Its chief industries are shipbuilding, brick-making, cotton spinning, foundry and machine shop products, cotton-seed oil, and the manufacture of tobasco sauce. It has numerous churches, good schools, three banks, and two newspapers. The waterworks and electric lighting plant are municipally owned and operated. The town is under the commission form of government. Pop., 1920, 6,278.

NEW JERSEY (40° N., 74° 30′ W.), N.E.state of U.S.; bounded N. by New York, W. by Pennsylvania and Delaware R., S. by Delaware Bay, and E. by Atlantic. Area: land surface, 7,525 sql m.; water surface, 710 sq. m. Coast-line is about 120 m., fringed with sand-bars numerous large inlets. Surface is mountainous in N.; Blue or Kittatinny Mts. (with High Point, 1,803 ft., Mt. Tammany, 1,480 ft.); S.E. of Blue Mts. is large plateau with average elevation *c.* 1,000 ft. Coastal region is marshy; in certain districts large swamps. Among rivers are Hudson, Delaware, Raritan, Great and Little Egg, Harbor Rivers, many navigable; numerous lakes in N., surrounded by fine scenery. Climate generally is healthy, especially in highlands, where there are many summer resorts. Fauna includes grey fox, deer, raccoon, opossum, chipmunk; extensive forests (chiefly pine) in S. region; large oak and chestnut forests in N. New Jersey is an important manufacturing and commercial state; chief products, corn, wheat, oats, potatoes, fruit, timber; main industries are textiles, machinery, iron and steel, leather, petroleum, refining, chemicals, pottery; also bricks, cement, and tiles; iron ore, pig ore, and zinc are mined; valuable fisheries (trout, sturgeon, black bass, oyster, perch, etc.).

First settlement by Dutch at Bergen, 1617; followed by Swed. settlement, 1638, which was taken by Dutch, 1655; several attempts made by English to plant colonies were prevented by Dutch. Charles II. granted the territory between Connecticut and Delaware Rivers, and islands between Cape Cod and Hudson River, to Duke of York, 1664, which he transferred to Lord John Berkeley and Sir George Carteret; first governor arrived, 1665. Serious disputes arose between governor and Quakers, which resulted in the divisions East Jersey (Carteret property) and West Jersey (Quaker property); reunited, 1702, when proprietary government ceased, and New Jersey was claimed by the Crown. Until 1738, New York and New Jersey had the same governor. The state took a leading part in the War of Independence and the Civil War; one of the thirteen original states of the Union.

New Jersey is administered by governor, senate (21 members, elected for three years), and general assembly (60 members); the state has two senators and 12 representatives in the Federal Congress, and is divided into 21 counties.

Principal towns are Newark, Jersey City, Paterson, Trenton (cap.), Camden, Hoboken, Elizabeth, Bayonne, and Passaic; numerous fine seaside resorts. Primary education is free and compulsory; there are Princeton Univ., 1746, Stevens Institute of Technology at Hoboken, Rutger's Coll. at New Brunswick. Total mileage of railway exceeds ',300. Pop., 1920, 3,155,900. See Map of U. S.

NEW JERSEY COASTAL INLAND WATERWAY. See CANAL.

NEW JERUSALEM, CHURCH OF THE.—Also known as 'New Church.' Organized in London, in 1787. Its doctrine is founded on the writings of Emanuel Swedenborg (*q.v.*). It was established in the United States, in Baltimore, in 1792, and organized in1817. In 1890, many members withdrew and organized The General Church of the New Jerusalem. The doctrine includes faith in one God, and in Him a Trinity, not of persons, but of essence. The Bible is inspired by the Lord, Himself. Redemption. God the Creator of the universe on the assumption, of birth by a Virgin of a human nature, to live a human life and redeem it. When a man dies he is raised up in his spiritual body and lives in Heaven or hell. They hold certain views on the laws of Divine order, faith and charity, repentance and regeneration. The polity is a modified Episcopacy. At the Annual General Conference every church member takes part.

NEW KENSINGTON, borough of Pennsylvania, composed of the sections of New Kensington, Parnassus, and Arnold in Westmoreland co., on the Allegheny River, 18 miles N.E. of Pittsburgh, and served by the Pennsylvania Railroad. Its chief industry is that of aluminum, the largest aluminum mill in the United States being located there. Other important manufacturing establishments are those dealing with tinplate, window glass, steel, and iron, white lead, lumber, and furniture. The city is handsomely laid out and has many imposing public and private buildings. There are excellent schools, churches, three banks, and three newspapers. Pop., 1920, 11,987.

NEWLANDS, FRANCIS GRIFFITH (1848-1917), United States Senator; *b.* in Natchez, Mississippi, August 28, 1848; *d.* in Washington, D.C., December 24, 1917. He studied at Yale and the Columbian Law School (now George Washington University), Washington, D.C.; bar, 1870; practised law in San Francisco until 1886, and then moved to Reno, Nevada, in 1889; elected to Congress from Nevada, 1893-1903, then senator, succeeding J. P. Jones, and re-elected, 1909-1914. Author of the Newland Act, providing for land improvement and irrigation of dry regions of the West. Chairman of Interstate Commerce Commission at time of death.

NEW LEON, OR NEUVO LEON, a city of Mexico. It has an area of 23,637 square miles. It is mountainous but fertile and has mines of lead, gold, silver and salt. The chief city is Monterey. Pop. about 275,000.

NEW LONDON, a city of Connecticut, and one of the county seats of New London co., on the Thames River, 50 miles S.E. of Hartford, and served by the Central Vermont and the New York, New Haven and Hartford railroads. It was founded in 1646, and incorporated as a town in 1784. It is a port of entry and has steamer connection with New York and various towns on Long Island. Its chief manufacturing establishments are brass and copper tube works, submarine engine plant, shipyards, silk mills, printpress works, foundries and machine shops. On the other side of the river is a Government Naval Station. It figured prominently in the events of the Revolutionary War. It was attacked by the British under Benedict Arnold, in 1781. The old schoolhouse still stands where Nathan Hale taught. The city is the center of the Connecticut lobster and fishing industries. It is a favorite summer resort, and the scene of the annual rowing race between Yale and Harvard. The government is vested in a mayor, elected for three years, and a council. There are excellent schools, churches public libraries, seven banks, and five newspapers and periodicals. Pop., 1920, 25,688.

NEWMAN, ALLEN GEORGE (1875), sculptor; *b.* in New York. Educated at College of the City of New York and the National Academy of Design. His most important works in bronze were *Triumph of Peace,* and *The Hiker*; in marble, *Night and Day,* in the Harriman bank at New York City; the monument erected at 72nd Street and Riverside Drive, New York; monument to the women of the South, Jacksonville, Florida; statue of General Stirling Price, Keytesville, Missouri; Joe Chandler Harris monument, Atlanta, Georgia; General Philip Sheridan Monument, Scranton, Pennsylvania; World War Monument and Doughboy Monument, Pittsburgh; statue of General Oates—ex-governor of Alabama.

NEWMAN, JOHN HENRY (1801-90), Eng. cardinal; *s.* of a banker. Educated at private school and Trinity Coll.,

Oxford, 1821; elected fellow of Oriel, 1822, and tutor, 1826, but lost his position owing to ecclesastical disputes, 1830. He travelled abroad, in 1833, visiting Rome, and on his return became the leader of the new Oxford Movement (*q.v.*), writing in *Tracts for the Times*, and having enormous influence in Oxford in the later thirties. But he had doubts about the position of the Anglican Church, and joined the Rom. communion, 1845. He was ordained priest in Rome, and held various positions in England. From 1854-58 he was rector of the Catholic Univ, in Dublin. He engaged in controversy and wrote various works, and was created cardinal, 1879.

NEWMARKET (52° 14′ N., 0° 24′ E.), town, Cambridge and Suffolk, England; horse-racing center. Pop. 10,000.

NEW MEXICO (35° N., 106° W.), S.W. state, U.S.; bounded N. by Colorado, W. by Arizona, S. by Mexico and Texas, E. by Texas and Oklahoma. Region consists of high tablelands, broken by lofty mountain ranges with general southern inclination; highest peaks (some over 12,000 ft.) belong to main chain of Rocky Mt. System in N. central portion of state; other ranges are Zuñi Mts. in N.W., Mimbres Mts. in W., and Guadalupe Mts. in S. Characteristic feature of state is flat-topped mountain or *Mesa*. In E. is vast extent of waste land known as Staked Plains or Llano Estacado. River valleys are generally level; most important rivers are Rio Grande, which crosses state from N. to S.; Canadian R. and Pecos in E.; Puerco, San Juan, Little Colorado, and Gila in W.

Valleys are productive, and other regions rendered fertile by irrigation; chief crops are wheat, corn, oats; cotton, vegetables, and fruits also cultivated; leading industry, stock raising, grasses on hills and plains being particularly fine for grazing purposes; sheep are raised for wool. New Mexico is rich in minerals; gold, silver, copper, coal, iron, and zinc worked; marble and sandstone quarried; turquoises and other precious stones found; mineral springs numerous. Other industries are flour and grist milling, printing, publishing, manufacture of cars, lumber and timber products, and blankets. There are 3,050 miles of railway in state. Chief towns are Santa Fé (cap.), Albuquerque (with univ.), Las Vegas, Roswell, and Raton; there are Pueblo Indian villages at Taos, Zuñi, Acoma, and elsewhere; many ruins of pueblos may be found. Inhabitants are chiefly Mexicans, Americans, and Indians. Governor is elected for four years. Senate has 24, house of representatives, 79 members.

After Mexican War, New Mexico was included in country ceded to U.S. by Treaty of Guadalupe-Hidalgo, 1848; portions added by cession from Texas and Gadsden Purchase; organized as terr., in 1850, and included parts of Arizona, Nevada, and Colorado; portion annexed to Colorado, 1861, and Arizona disjoined, 1863; admitted as state in 1911. Area, 122,634 sq. miles. Pop., 1920, 360,350. See Map of U. S.

NEW MODEL, Eng. parliamentary army as reorganized, 1645, by Cromwell (*q.v.*); commanded by Fairfax.

NEWNAN, a city of Georgia, and county seat of Coweta co., 38 miles SW., of Atlanta; served by the Atlanta and West Point, and the Central of Georgia railroads. It is the center of a fertile cotton and fruit growing section, and does a large trade in agricultural products. Its chief manufacturing establishments are grain elevators, tanneries, fertilizing works, cotton and cotton-seed oil mills, boiler factories, and machine shops. There is a handsome court house, a Carnegie library, good schools, churches, four banks, and a newspaper. The waterworks and electric lighting plant are owned by the city. Pop., 1920, 7,037.

NEW NETHERLAND. See NEW YORK.

NEW ORLEANS, largest city of the Southern States, in Louisiana, and 17th city of the United States in point of population; located on the Mississippi River, 107 miles from its mouth. Its total area is 196 sq. miles. It derives its popular name of the 'Crescent City' from the fact that it was originally built along a great bend of the Mississippi River, though its subsequent growth has made that name a misnomer. The location of the city on the Mississippi gives it great commercial importance. Forty-five steamship lines leave and enter the port. It is served by twelve railways, ten of them trunk lines, the most important of which are the Illinois Central, Louisvile and Nashville, Southern, and the Southern Pacific. Its commanding position makes it the chief commercial city of the South, and in some years the volume of foreign trade through New Orleans has been exceeded only by that of New York. Its leading industries are sugar and molasses, rice, tobacco, cotton goods, cotton-seed products, canned goods, steel and wooden ships, foundry and machine shop products. It is the largest lumber market of the South, and the largest in the United States for cotton, sugar, bananas, and oysters. It has eight miles of wharves equipped with the most up-to-date

mechanical devices, and a railway 50 miles long, publicly owned, which connects all railways, wharves, and about 80 of the most important industrial plants. As there are 41 miles of river front under the control of the dock board, the harbor facilities can be indefinitely extended. A U.S. Naval Station at Algiers, across the river, has complete repair facilities and a dry dock which can accommodate vessels up to 18,000 tons. The great canal that has recently united the Mississippi River and the waters of Lake Pontchartrain has enormously increased the city's commercial importance. Architecturally, the city is a combination of the old and the new, the older part bearing a strong impression of the French and Spanish influence. The Creole population (whites of Spanish and French descent) comprises about one-sixth of the entire population of the city. The newer section contains many imposing public and private buildings, such as the U.S. Mint, the new Court House, Post Office, Cotton Exchange, Custom House, University buildings, and church edifices. Prominent among the educational institutions, are the Leland, Straight, New Orleans, Loyola, and Tulane Universities. The medical college connected with the latter and the finely equipped hospitals have made New Orleans one of the chief medical centers of the United States. There are over 100 public schools, and 125 parochial and private schools. The libraries of the city contain over 500,000 volumes. There are more than 300 churches, 82 banking institutions, and 49 newspapers and periodicals. The city is operated under the commission form of government, a mayor and four other commissioners being elected on a general ticket. For administrative purposes, the city is divided into seven districts and 17 wards. New Orleans was the scene of the greatest battle of the War of 1812, and played a prominent part in the Civil War, being captured, in 1862, by combined military and naval forces, under the command of General Butler and Admiral Farragut. Pop., 1920, 387,219.

NEW ORLEANS, BATTLE OF, an engagement between American and British forces during the War of 1812, constituting the one important victory won by the Americans on land during the entire war. Wishing to obtain control of the mouth of the Mississippi River, the adjacent territory and its trade, the British Government sent against New Orleans an army of 12,000 men, seasoned veterans from the Napoleonic War. Andrew Jackson, who was in command of the small garrison at New Orleans, being appraised a short time ahead of the coming attack, hastily enlarged his force by recruiting all the available men at hand, including even free negroes and convicts. With this force, numbering less than 6,000 men, he threw up breastworks about the city, of earth and cotton bales. Posted behind these defenses, his men awaited the attack, which began on January 8, 1815. Before the advancing British infantry could get into effective action, the American artillery began a heavy fire which caused severe casualties among the British troops. Within half an hour, 2,600 of the British and their field commander, General Pakenham, were killed or wounded, one-fifth of their fighting force being put out of action. The Americans suffered less than 70 casualties during the whole engagement. Within an hour of beginning their attack, the British were compelled to withdraw out of the zone of fire. It is a notable fact that this bloody engagement was fought after the war had ceased, peace having been agreed upon on December 24, 1814, two weeks before the battle.

NEW ORLEANS INDUSTRIAL CANAL, a new waterway for ocean-going vessels; part of the city's inner harbor project; extending for five miles between Lake Pontchartrain and theMississippi. It was constructed by the State of Louisiana at an outlay of $20,000,000, and was opened in May, 1923. The canal is part of a larger scheme to cut a ship channel through the lake to Lake Borgne and Mississippi Sound, to enable steamers to reach New Orleans without making the 100-mile trip against the swift current of the Mississippi River. Docks and warehouses are to be built along the canal banks and hundreds of adjacent acres have been reserved for industrial plants.

NEW ORLEANS UNIVERSITY. —Founded in 1873, by the Methodist Episcopal Church as a co-educational institution for young negroes. There is a preparatory and collegiate department and degrees of A.B., B.S., and Ph.B. are conferred on graduates. The grounds and buildings are valued at $250,000. The library contains over 7,000 volumes.

NEW PHILADELPHIA, a city of Ohio, and county seat of Tuscarawas co., on the Tuscarawas River, and the Ohio Canal, 90 miles south of Cleveland, served by the Baltimore and Ohio, and Pennsylvania railroads. It is the natural market and shipping point for a fertile agricultural region, and also has important industrial establishments, chief of which are steel works, flour mills, canneries, broom factories, tile plants, carriage works, and vacuum cleaner factories.

Excellent water power and fine transportation facilities have been factors in its growth. The town was settled in 1805, and incorporated three years later. It has excellent schools, churches, a public library, four banks and three newspapers. The government is vested in a mayor and a council, the latter body appointing the administrative officials. Pop., 1920, 10,718.

NEW PLYMOUTH (39° 5′ S., 174° 5′ E.), seaport, W. coast, N. island of New Zealand; exports dairy produce. Pop., 1921, 12,645.

NEWPORT.—(1) (51° 35′ N., 3° W.), town, Monmouthshire, England; has important iron and chemical manufactures, and exports large quantities of coal and iron; has ruined castle and fine old church; R.C. episcopal see. Pop., 1921, 3,700. (2) (50° 42′ N., 1° 18′ W.), town, Isle of Wight, England; in neighborhood are remains of Carisbrooke Castle; XVII. cent. school. Pop., 1921, 11,036. (3) (52° 47′ N., 2° 23′ W.), town, Shropshire, England; in neighborhood are remains of Lilleshall Abbey; XVII. cent. school. Pop. 3,500.

NEWPORT, a city of Kentucky, and county seat of Campbell co., at the confluence of the Ohio and Licking rivers, and directly across the Ohio from Cincinnati. It is served by the Chesapeake and Ohio, and Louisville and Nashville railroads. It was settled in 1791, and became a city in 1850. It is the center of a productive agricultural region, and carries on an extensive trade in farm products. Its chief industrial plants are carriage works, watch-case factories, lithographing plants, steel and sheet-iron works, and fly-screen factories. There are also extensive brickyards, and a large trade is carried on in coal. There are many handsome public and private buildings, including the Court House, City Hall, a Masonic building two Catholic academies, and a public library. There are good public and parochial schools, churches, four banks, and a newspaper. The city has as residents many business men of Cincinnati. It is operated under the commission form of government. The water-works are municipally-owned and operated. Pop. 1920, 29,317.

NEWPORT, a city of Rhode Island, and county seat of Newport co., on Narragansett Bay, 30 miles S. of Providence; served by the New York, New Haven and Hartford Railroad. It was founded, in 1639, by Roger Williams. In the early colonial days it was a place of considerable commercial importance, and at one period, 1769-70, its trade was greater than that of New York. The city was almost ruined by the British during the two years that they occupied it ,1776-78, In 1780, it served for a time as the headquarters of the French troops, under Rochambeau. Historic interest resides in the fact that Newport is claimed by some historians to have been discovered by the Northmen. The city abounds in relics and buildings of Colonial and Revolutionary times. It is the site of the U.S. War College, a torpedo station, and a Naval Training Station. Its chief prominence today is as a famous summer resort of some of the wealthiest families in the country. There is little trade or commerce apart from that connected with fisheries. There are numerous churches, good schools, several public libraries, ten banks, and six newspapers and periodicals. Pop., 1920, 30,255.

NEWPORT NEWS, a city of Virginia, in Warwick co., on the James River and Hampton Roads, 70 miles S.E. of Richmond, and at the terminus of the Chesapeake and Ohio Railroad. It has a capacious harbor and splendid shipping facilities, and carries on an enormous foreign trade. It is the fourth city of the Union as regards shipments of grain. It has one of the largest shipbuilding plants in the world, and was selected by the United States Government for the refitting and reconditioning of the *Leviathan*, in 1923. There are great drydocks, grain elevators, wood-working mills, iron works, shoe factories, lumber mills, and shirt factories. The city is governed by a mayor, common council and board of aldermen. There are good schools, churches, seven banks, and three newspapers. The city was incorporated in 1896, and its growth has been very rapid. Pop., 1920, 35,596.

NEW PROVIDENCE. See BAHAMAS.

NEW ROCHELLE, a city of New York in Westchester co., on Long Island Sound, about 16 miles from the Grand Central Station, New York City. It is served by the New York, New Haven and Hartford Railroad, and has excellent electric traction service that connects it with New York and other cities. It was settled by Huguenots, in 1687. It is, in the main, a residential city for New York business men. There are many handsome modern buildings as well as a number that have historic associations, some of the churches and other edifices having been built in Colonial and Revolutionary times. The city is beautifully laid out and has well maintained streets, avenues, and parks. The water supply is exceptionally pure and the death rate very low. There are good public and parish schools, numerous churches, five banks,

and seven newspapers and periodicals. Pop., 1920, 36,213.

NEWRY (54° 11′ N., 6° 20′ W.), seaport, on Carlingford Lough— County Down, Ireland; flax-spinning and flour-mills. Pop. 12,000.

NEW SIBERIA ARCHIPELAGO (75° N., 140° E.), group of islands (discovered, 1770) in Arctic Ocean, N. of Siberian coast; consisting of Kotelnoi, Byelkovskiy, Thaddeus or Fadievskoi, New Siberia, and Lyakhov Islands; area, 9,650 sq. miles; highly interesting fossil flore and fauna (mammoth, rhinoceros, etc.); uninhabited.

NEWSOM, CURTIS BISHOP, clergyman and educator; *b.* at Elizabethtown, Indiana. In 1896, graduated from Earlham College; until 1904, a teacher and superintendent of schools; ordained a Presbyterian minister in 1907; and pastor of the Granville Avenue Church, in Chicago, from 1906-1909; pastor in 1909-1915, of the 1st Church, Sturgis, Michigan; from 1915-1920, at Trinity University, Waxahachie, Texas, as dean of the University, and professor of philosophy and English Bible; since 1920, Bushnell, professor of Biblical history, literature and education. Wrote on educational and religious subjects.

NEW SOUTH WALES, oldest state of the Australian Commonwealth, in S.E. of the continent (28°-37′ 30′ S., 141°-153° E.); bounded N. by Queensland, W. by South Australia, S. by Victoria, E. by Pacific Ocean; coast-line from Cape Howe to Point Danger, *c.* 700 miles; breadth, 800 miles; area, 310,700 sq. miles. State is traversed from N. to S. by mountain ranges belonging to the Great Dividing Range or Cordillera of Australia; New England and Liverpool ranges in N., 5,000 ft.; Blue Mts., W. of Sydney, 4,100 ft.; Cullarin, Monaro, and Muniong ranges (with highest peak, Mt. Kosciusko, 7,308 ft.) in S. Western part consists of extensive plains with fine pasture lands; climate healthy. The northern coastal districts are dry and subtropical; interior and W. plains hotter than coast; extensive forests, chief tree, eucalyptus; great variety of birds with goregous plumage. Chief rivers are Murray, Murrumbidgee, Darling, Lachlan, Hunter, Richmond, Clarence (many navigable); some unimportant lakes; many excellent harbors—Port Jackson, Jervis Bay, Broken Bay, Port Stephens, Hocking, Wollongong, Shoalhaven, Bateman's Bay, etc. Principal towns are Sydney (cap.), Newcastle, Bathurst, Goulburn, Broken Hill; Yass-Canberra dist. is site of Federal cap. Irrigation is rapidly extending; enormous herds of sheep and cattle; fish abound; chief exports, frozen and preserved meat, wool, gold, silver, tin, copper, lead, coal, wheat, fruit, timber, hides and skins, butter, tallow, leather, coconut oil; manufactures not extensive, but increasing rapidly.

Coast was probably sighted by Span. vessels in the VI. cent.; visited and named New South Wales by Cook, 1770; founded as a penal settlement, 1788; prospered under governor, Lachlan Macquarie; transportation ceased, 1839; S. districts severed, 1851; as Victoria, and Moreton Bay district as Queensland, 1859; responsible government granted, 1859; gold discovered near Bathurst, 1851; joined Commonwealth of Australia, 1901. State was explored by Wentworth, Blaxton, and Lawson, 1813, Evan and Oxley, 1815, Hume and Hovell, 1824, Cunningham, 1827, Mitchell, 1831-6, Sturt, 1844, etc.

New South Wales has a governor, appointed by the crown, and state parliament, consisting of legislative council and legislative assembly; women hold franchise. Church of England is predominant. Education is compulsory between ages of six and 14; univ. and technical college at Sydney. There are over 4,600 miles of state railways.

Dependencies of New South Wales are Norfolk Island, situated in 29° S., 163° W.; area, 10 sq. miles; and Lord Howe Island, (31° S., 159° E. Pop., 1921, 2,101,300. See Map of Australasia.

NEWSPAPER.—Daily, semi-weekly, and weekly, publications devoted to news and comment. The oldest newspaper in the world is the Chinese *Ti Chau* or *The Peking Gazette*, first issued in 1340 A.D., and still published. The first news sheets in Europe appeared in last two decades of the XV. cent., at Augsburg, Vienna, Ratisbon, and Nuremsberg. They consisted generally of one small page describing some world event, such as the discovery of America, and striking local occurrences. The first Italian paper published in Venice, in 1562, was sold for a small coin called a *gazetta*, hence the popular name *gazette* for newspapers. In England, a news-bulletin called *Relations*, appeared, in 1462. *New Tidings*, 1527, was devoted to a single subject. *News from Spain*, in Queen Elizabeth's time, describes the movements of the Spanish Armada. The first English newspaper was published in Amsterdam, December 2, 1620, by Petrus Keerius, a Dutch bookseller. It was a folio, and printed on both sides. In Ireland, *The Dublin News-letter* appeared in 1685. The first Scotch newspaper was *The Mercurius Caledonius*, 1660. *The Gazette de France* appeared in

631, and the *Frankfort Post* in Germany, n 1615. In the United States, the *Boston Vews-letter* was first published in 1704, y John Campbell, a Scotchman. The rst newspaper issued outside of New ngland was the *American Weekly Mer-ury*, of Philadelphia, December, 1719, y Andrew Bradford. The first paper in lew York was the *New York Gazette*, 755. By 1740, there were 11 news-apers in America. In 1922, the number f daily and Sunday papers was as fol-ows: Morning dailies, 720, average circu-ation per issue, 12,882,841; Evening ailies, 1,721, total average circulation er issue, 20,445,789. Receipts from ubscriptions and sales, $192,819,519. rom advertisements, $373,501,890. unday papers, 604, combined circula-ion per issue, 19,368,913. The greatest ews-gathering association is The Asso-iated Press which serves 1,181 papers, 923. It is a mutual benefit concern, aking no profits, and every member as a vote in its control. See JOURNAL-M.

NEW TESTAMENT. See BIBLE.

NEW THOUGHT, a popular form of ysticism which appeals to those who ave temperamentally reacted against e old orthodox forms of religion, called y some the successor to the old New ngland transcendentalism of Emerson, ut far more objective, less speculative. hile many teachers of New Thought ill probably deny this, there is little oubt that the original impulse which eveloped the movement was launched y P. P. Quimby, of Portland, Me., hose teachings and, more important ill, whose demonstrations in the action the subconscious mind so deeply im-ressed Mrs. Eddy, of Christian Science me. While the outward manifestation New Thought differs widely from hristian Science, the former being real nd objective to its adherants, while the tter holds everything illusive outside mind, in their material basis they are the same origin. This common basis the power of the subconscious mind er the sensations of the body; the auto-ggestion of Emile Coué. This power e followers of New Thought exercise, t only to cure sickness, like the hristian Scientists, but to produce all arieties of mental states which, when ne involuntarily, is pure mysticism, ut when done voluntarily is, as Coué s termed it, conscious auto-suggestion. heir mystic terminology is but a vocab-ary borrowed from Oriental occultism explain their sensations. The fol-wers of New Thought number millions, this country and abroad, but their eas are too vague to enable them to rm a close-knit organization, such as a church held together by a dogma. Yet an attempt has been made to federate the numerous local societies into the Inter-national New Thought Alliance. The official organ of the Alliance is *The Nautilus*.

NEWTON, a city of Kansas, and county seat of Harvey co., 115 miles S.W. of Topeka; served by the Missouri Pacific, and Atchinson, Topeka and Santa Fe railroads. It is the natural market and shipping point of one of the richest agricultural sections of the state. Its chief industrial establishments are flour mills, creameries, ice plants, and stock yards. It also has large railroad repair shops. It was settled in 1871, and became a city in 1880. Bethel College is located there. The city has excellent schools, 17 churches, a public library, four banks, and six newspapers and periodicals. The government is vested in a mayor, elected for two years, and two commissioners. Pop., 1920, 9,781.

NEWTON, a city of Massachusetts, in Middlesex co., on the Charles River, six miles W. of Boston; served by the Boston and Albany Railroad. It was settled in 1631, and received a city charter in 1873. It has an area of 18 sq. miles; is beautifully laid out and has magnificent streets, avenues, and parks. Its chief industrial establishments are rubber works, worsted mills, cordage factories, printing plants, and silk mills. It is a desirable residential city and a noted educational center. Among its more prominent institutions are Lasell Seminary, Newton Theological Seminary (Baptist), Boston College (Catholic), St. John's Industrial School, and the Mount Ida School for Young Women. There are excellent public and parochial schools, churches with handsome edifices, a public library of 100,000 volumes, two banks, and four newspapers and periodicals. The city is governed by a mayor and board of aldermen. The waterworks are municipally-owned and operated. Pop., 1920, 46,054.

NEWTON, ALFRED (1829-1907), Eng. zoologist; eminent student of ornithology and zoogeography.

NEWTON, SIR ISAAC (1642-1727), Eng. natural philosopher; *b.* Woolsthorpe, Lincolnshire; inventor of the binominal theorem, method of tangents, and fluxional calculus. Tradition has it that the sight of a falling apple in his garden first influenced him towards research concerning the attraction of the earth, which culminated in his discovery of gravity, 1665. In immediate sequence followed a deduction of the law of inverse squares from Kepler's third law,

but not until 1685, following on experiments by Picard, which furnished a reliable value for the terrestrial radius, was he able to prove its exactness.

The first volume of his *Philosophiæ Naturalis Principia Mathematica, 1687*, was an exposition of the dynamic results of the law of inverse squares; the second, a treatise on motion in resisting mediums, hydrostatics, hydrodynamics, and tides; the third dealt with planetary motion and comets. In 1666 he turned to optical research, and resolved white light into its constituent colors; in 1668 he invented the reflecting telescope, and, lecturing before the Royal Soc., in 1672 and 1675, read papers on prismatic experiments and the phenomena due to interference of light rays known as *Newton's Rings*. Subsequently he published a volume, *Optics*, favoring the emission of light theory, and embodying the results of his papers. In 1669 he was appointed to the chair of Math's at Cambridge Univ., representing the univ. in Parliament, in 1689, and in 1701, as a Whig, being defeated at the polls, in 1705; app. Warden of the Mint, 1696, Master in 1669, knighted in 1705; he was Pres. of the Royal Soc. from 1703 till his death.

In 1692 he drew up a treatise on the calculus for math's. A controversy with Leibnitz started, in 1705, and, lasting 20 years, finally vindicated his own claims of priority in the discovery of the calculus theory. He was buried in Westminster Abbey.

NEWTON, JOHN (1725-1807), Anglican divine; sailor, 1737-55; ordained, 1764; with William Cowper, pub. *Olney Hymns*.

NEWTON, JOSEPH FORT (1876), an American clergyman; *b.* at Decatur, Texas; *s.* of Lee and Sue G. Battle Newton. He was educated largely by his *m.*, and later was a student at Hardy Inst. (now defunct), and the Southern Baptist Theological Seminary. He was ordained a Baptist minister, in 1893, and was afterwards pastor of various churches including the People's Church, Dixon, Ill., of which he was the founder, and the City Temple, London, England, from 1916-19, after which he became pastor of the Church of the Divine Paternity, New York. In addition to numerous addresses and sermons, he wrote many pamphlets on patriotic and Masonic topics, and several books, among which are *The Theology of Civilization, 1919*; and *The Inevitable Christ, 1922*.

NEWTON ABBOT (50° 32′ N., 3° 36′ W.), town, Devonshire, England, on Teign estuary; railway workshops; exports potter's clay. Pop. 14,000.

NEWTON-IN-MAKERFIELD, NEWTON-LE-WILLOWS (53° 28′ N., 2° 37′ W.), town, Lancashire, England; printing works and paper mills. Pop. 19,000.

NEWTON THEOLOGICAL INSTITUTE, an institution founded in 1825, by the Baptists of New England, at Newton, Mass. Its regular course covers a period of three years. Its library contains 34,000 volumes. Its buildings and grounds represent an investment of $400,000, and it has $1,400,000 in productive funds, besides an endowment of $800,000. The teaching staff numbers 10, and the student body average about 90.

NEWTOWN.—(1) (42° 31′ N., 3° 20′ W.), town, on Severn, Montgomeryshire, England; flannel. Pop. 6,000. (2) S.W. suburb, Sydney, New South Wales. Pop. 24,000.

NEWTOWNARDS (54° 36′ N., 5° 41′ W.), seaport, County Down, Ireland, on Lough Strangford; muslin embroidery, linens. Pop. 9,000.

NEWTS, EFTS, members of the amphibian genus *Molge*, found in both Old and New Worlds; small, long-tailed, cylindrical animals, some five or six inches in length. The tail is sometimes surmounted by a crest or fin. Their food consists of worms and aquatic insects, for they are predominantly aquatic creatures; but the Land and Cave Newts of America live almost entirely on land.

NEW ULM, a city of Minnesota, and county seat of Brown co., on the Minnesota River, 80 miles S.W. of St. Paul; served by the Chicago and Northwestern and Minneapolis and St. Louis railroads. It was settled in 1854, and received a city charter in 1876. It is the center and shipping point of a fertile agricultural and stock-raising section. Its main industrial establishments are grain elevators, brick and lumber yards, machine shops, cigar factories, organ works, flour mills, cooperages, and machine works. The city was the scene of an Indian massacre in 1862. There are numerous churches, good public and parochial schools, six banks, and seven newspapers and periodicals. The electric lighting plant and waterworks are owned and operated by the city. The government is vested in a mayor and council. Pop., 1920, 6,745.

NEW WESTMINSTER (49° 15′ N., 122° 45′ W.), city, on Fraser, Brit. Columbia, Canada; salmon canneries; sawmills. Pop. 17,000.

NEW YEAR'S DAY, the first day of the year and, according to their respective reckonings, celebrated by most peoples. The Christian fathers abolished its veneration as a religious festival owing to its pagan association.

NEW YORK (43° N., 75° W.); N.E. state of the U. S.; bounded N. by Quebec, N.W. and W. by Ontario, Lake Ontario, Lake Erie, and Pennsylvania, S. by Pennsylvania, New Jersey, and Atlantic, E. by Connecticut, Massachusetts, and Vermont; length from N. to S., 320 mile breadth, 310 miles. New York includes Long. I. and Staten I. on Atlantic coast, besides numerous other islands—viz. Manhattan, Randall's, Hart's, Faulkner's, The Thimbles, etc. The state has a coast-line of *c.* 275 m. on Lakes Erie and Ontario, with several good harbors—Buffalo, Dunkirk, Fairhaven, Oswego, etc.; the ocean seaboard is small but important, containing the harbor of New York city. Surface is mountainous in N.E., E., and S.E.; Adirondack Mts. in N.E., highest peak Mt. Marcy (5,344 ft.); Catskill Mts. in S.E., with Slide Mt. (4,205 ft.); extensive tableland in central and W. regions; coastal districts level. Geologically New York belongs mainly to the Archæan and Palæozoic periods; almost the whole surface is covered with glacial drifts. Principal river is Hudson, which, with its tributary the Mohawk, is chief route to interior plains; there sre many fine falls and rapids—Niagara, Trenton, Taughannock, Genessee, etc. There are hundreds of lakes throughout the state, parts of Lakes Ontario, Erie, and Champlain, Lakes George, Keuka, Seneca, etc.; many rivers and lakes are navigable. Climate generally is healthy, with hot summers and severe winters; mean annual temp., 46° F.; coldest in Adirondack region; average rainfall from 40 to 45 in.; greatest in Adirondack Mts. Fauna includes deer, beaver, elk, moose, red fox, black bear, skunk, porcupine, raccoon, mink, weasel; birds include plover, snipe, tern, grouse, woodcock, thrush, warbler, wren, chickadee, orioles. Immense forests stretch in Adirondack region (mainly spruce, hemlock, pine, maple, beech, yellow birch) and in Catskill region (mainly oak, hickory, chestnut); much pasture and arable land in plateau regions.

Principal products are corn, wheat, oats, potatoes, hay, tobacco, fruit, sugar-beet, timber, live stock, wool. Important industries are manufacturing of clothing, machinery, printing and publishing, sugar and molasses refining, dairy produce, slaughtering, and meat-packing; flour, paper, petroleum refining, silk and silk goods, cement, and extensive clay products. State has numerous mineral springs—viz., Onondaga, Ballston, Saratoga, etc.; minerals include magnetic iron ore, natural gas, copper, zinc, lead, talc; salt petroleum, marble, graphite, limestone, etc., are quarried; valuable fisheries (oysters), etc. Railway mileage, 8,534, and over 3,000 miles of single track electric lines. Length of canals, 638 (Erie Canal, 361) m.; state Barge Canal (New York to Buffalo), 790 m., with minimum depth of 12 ft.

The state is administered by governor, senate (51 members, elected for two years), and an assembly (150 members, elected for one year). New York has two senators and 43 representatives in Congress, and is divided into 62 counties. Principal cities are New York Buffalo, Rochester, Syracuse, Albany (cap.), Schenectady, Yonkers, Utica, Troy, Binghamton.

Education is compulsory between ages of seven and sixteen, and maintained chiefly by local taxation. New York has many universities, colleges, and other institutions, including Columbia Univ. (Manhattan), Cornell Univ. (Ithaca), New York Univ., Syracuse Univ., Union Univ. (Schenectady), City of New York Coll., Barnard Coll. (Manhattan), Polytechnic Institute (Brooklyn), Adelphi Coll. (Brooklyn), U.S. Military Academy (West Point). The univ. of the state of New York is non-teaching and purely administrative, supervising higher education in the state.

The first permanent settlement was made, 1624, under Cornelis Jacobsen Mey; New Netherland was declared a province in 1643. Charles II. granted the terr. to Duke of York, and, in 1664, the English took possession of it and named it New York; retaken by Dutch, 1673; finally taken by English, 1674; became a royal province, 1686; severe conflicts with Indians ensued, also various boundary disputes. New York took a prominent part in the War of Independence and the Civil War in 1861, and together with New York City was loyal to the Unionists. New York is one of the original thirteen states of the Union; it is the most populous state. Area, 49,204 sq. miles, of which 1,550 sq. miles are water. Pop., 1920, 10,384,829. See Map of U. S.

NEW YORK (41° 6′ N., 74° W.), largest city of U.S., in New York State, and second largest city the world; situated on the Hudson (North) River, at its confluence with East R. City comprises Manhattan I., separated from mainland by Harlem R. and Spuyten Duyvil Creek, Long I., Staten I., Blackwell's Randall's, Ward's, Governor's, and other small islands; also a number of former villages—Washington Heights, Harlem,

Port Morris, Inwood, Tremont, Fordham, Riverdale, etc.

New York is divided into five boroughs—Manhattan on Manhattan I., Richmond, on Staten I., Brooklyn, on W. part, Queens, on N. part of Long I., Bronx on mainland. Length from N. to S. is *c.* 35 miles; breadth, E. to W., 16 miles; area, *c.* 327 sq. miles.

The harbor, one of the finest in the world, consists of outer harbor or Lower Bay (area, 88 sq. m.), separated from Atlantic Ocean by Sandy Hook bar, and inner harbor or Upper Bay (14 sq. m.), connected with former by the Narrows, a strait, one mile wide, between Long and Staten Islands; another channel, Kill van Kull, for smaller vessels, runs round Long I. The approach has fortifications at Sandy Hook, the Narrows, and at upper entrance to East R. The Statue of Liberty stand in Upper Bay.

The larger part of the city is laid out very regularly; long wide parallel avenues (First to Eleventh Avenue) run N. and S., crossed at fixed intervals by scores of streets, numbered First, Second, Third, etc. After Fifty-Ninth Street they are broken by Central Park. The so-called East Side is the tenement dist., consisting of narrow, irregular, densely populated streets. Principal business centers are Broadway, Wall and New Streets, etc.; handsome residential streets —Fifth Avenue, Madison Avenue, Park Ave., etc. A striking feature of the city are the sky-scrapers, such as the Metropolitan Life Insurance (693 ft. high), City Investing Buildings (32 stories), Singer Sewing Machine Co. (618 ft. high, 40 stories), Trust Co. of America (23 stories), Board Exchange, Commercial Buildings, etc.; the new Woolworth building attains 750 ft., with 40 floors. Prominent public edifices are City Hall, in Ital. Renaissance style, 1803-12, Appellate Court House, Municipal Building, Tombs (city prison), U.S. Sub-Treasury, Post Office, Metropolitan Museum of Art, Amer. Museum of Natural History, National Academy of Design, Public (Lenox, Astor and Tilden) Library, Metropolitan Opera House, Manhattan Opera House, Carnegie Music Hall, Mendelssohn Hall, Columbia Univ., New York Univ., Fordham Univ., Academy of Medicine, Trinity Church, 1839-46, St. Patrick's R.C. Cathedral, 1850-79, St. John's Cathedral, and numerous other churches and synagogues. There are several fine parks —Central, Battery, Roger Morris, in Manhattan; van Cortlandt, Pelham, Bronx (with fine Botanical and Zoological Gardens) in Bronx; Prospect Park (Brooklyn), etc. Statue of Liberty (Bartholdi), of Columbus, of General Sherman, of Joan of Arc, and many other monuments. The various divisions of the the city are linked by numerous bridges, ferries, tunnels, and an extensive system of electric tramways, elevated roads, and subway lines. The two suspension bridges, Williamsburg, 1904, and Brooklyn, 1870-83, are specially noteworthy (see BRIDGES). The new water supply from the Catskill Mts. is ample. Celebrated clubs include, New York, Knickerbocker, Manhattan, Union.

New York is the first seaport of the world, and greatest manufacturing center of United States; it receives 60 per cent of the total imports, and sends out over 45 per cent of total exports of the country. Chief industries are manufacturing of clothing, textiles, printing and publishing, machinery, iron and steel goods, scientific and musical instruments, sugar and molasses refining, packing and preserving of meat; principal exports—raw cotton, bacon, hams and lard, wheat, corn, oats, copper ore, machinery, agricultural implements, sewing-machines, locomotives, musical and scientific instruments, furniture, carriages, iron and steel goods, cattle and horses, tobacco, leather, paraffin, cotton-seed oil, meat products. New York, where three-fourths of the immigrants land, is perhaps the most cosmopolitan city in the world, and has numerous foreign colonies, such as the German colony, Greek colony, Little Italy, Chinatown, Hebrew, Russian, and Negro quarters, etc.

The city is governed by mayor (elected for four years), president of the Board of Aldermen (elected by the city, five bor. presidents (each elected for four years), and 73 aldermen (elected for two uears). The mayor appoints all heads of departments except finance, which is under a comptroller elected by the city.

On establishment of republic, New York was the Federal capital, 1785-90; Erie Canal opened in 1825, which was of great commercial importance to New York. Great Fire destroyed 'East Side,' 1835; Croton Aqueduct completed, 1842; anti-conscription disturbances, in 1863. In 1898, New York, Brooklyn, Long I., Staten I., etc., were amalgamated. The city is governed in accordance with the new charter of 1907. The most recent history of the city is a record of improvements, especially in communications. Pop., 1920, 5,620,048.

NEW YORK BARGE CANAL, THE —The canal system of New York State, which includes the Erie, Champlain, Oswego, Cayuga, and Seneca canals. A committee appointed by Governor Black, in 1899, recommended that the canals should not be abandoned but enlarged. The Barge Canal Law of April, 1903, approved by the votes of the people, ap-

propriated $101,000,000, to improve the Erie, Champlain, and Oswego Canals, making the depth 12 ft., width 75 at bottom in land sections, and 200 in rivers and lakes. Work began in 1905, and in May, 1915, the E. part of the Erie branch of the Barge Canal was opened for traffic. In 1909, the state appropriated $9,000,000 to improve Cayuga and Seneca canals. The Barge Law provided only for boats of 1,000 tons, but locks were orderd from 28 to 45 feet., permitting locktion of boats of 3,400 tons. The locks are 328 ft. between gates, 45 ft. wide, 12 ft. deep, lifts 6 to 40½. There are to be 35 standardized locks on the Erie branch, 11 on Champlain, and seven on Oswego. The siphon lock at Oswego is the only one of its kind in the United States, and the largest in the world. There are 30 fixed dams, the more important being on the Mohawk River below Schenectady, at Crescent and Vischer's Ferry, 2,000 ft. long and 40 ft. high. The eight bridge dams between Schenectady and Mindenville can be moved; there are to be 300, when completed. A siphon spillway automatically regulates the water surface. The cost of the Barge Canal, in 1921, was $167,123,774. In that year the commerce was 1,457,802 tons. The estimated tonnage of the canal system is 20,000,000 tons, but 25,000,000 tons could be handled. When the United States entered the World War, the Government commandeered a fleet of barges. By act of Congress, February 28, 1921, three-fourths of the fleet were relinquished, the remained being retained for other waterways. A New York syndicate bought a large part of the canal fleet for $1,000,000.

NEW YORK, COLLEGE OF THE CITY OF, an educational institution for males only, founded by the Board of Education of New York City, in 1848, as the Free Academy, acquiring its present name and status as a college, in 1854. The tuition is free to residents of the city. The teaching staff numbers about 250, and the student body averages 7,000. The annual cost is about $250,000. It occupies buildings on Harlem Heights, valued at $4,000,000.

NEW YORK CLEARING HOUSE ASSOCIATION. See CLEARING HOUSE.

NEW YORK PUBLIC LIBRARY.—Astor-Lenox-Tilden Foundation, May 23, 1895. A consolidation of the Astor and Lenox libraries and the Tilden Trust. Samuel J. Tilden bequeathed about $2,000,000 and 20,000 books to found a free library and reading-room. The collection of books, after consolidation, was about 350,000 volumes. Endowment fund, $350,000. In 1901, the New York Free Circulating Library was added. New York City presented the site of the old Murry Hill Reservoir, Fifth Avenue and 42nd Street, for the new library. Carrere & Hastings made the plans, and the building was opened, May 23, 1911. The library is of white marble, 390 ft. long, 270 ft. deep; contains 200 rooms, and cost about $9,000,000. It has shelving capacity for 3,500,000 books. Among interesting features of the library is a department for the blind, and of Slavonic, Jewish, and Oriental literature for scholars. The main reading room has seating capacity for 768 readers. Andrew Carnegie, May 12, 1901, offered $5,200,000 for branch libraries, if the city gave land, and provided for their maintenance. There are now 42 branch libraries, and in addition, six sub-branches in hired quarters, in Greater New York. In 1909, John H. Kennedy bequeathed $3,000,000 to the library. Number of persons using reference library, 1921, 1,157,275. Books circulated for home reading, 10,226,366. Cost of reference department, $979,221.26. Of circulation department, $1,190,982.72. Director, Edwin H. Anderson.

NEW YORK UNIVERSITY, a nonsectarian, state institution, founded in 1830, in New York City. It includes the following colleges and departments: Arts and Pure Sciences, Engineering, the University and Bellevue Hospital Medical College, Law, Commerce, Accounts and Finance, the Washington Square College, the Graduate School, the School of Education, the Wall Street Division, the Graduate School of Business Administration, the Women's Law Class, and the Summer School. During the session of 1921-2 the total enrollment amounted to 11,514, the business departments and law attracting the greater number of students. The summer school had an attendance of 1,096. The teaching staff numbered 635.

NEW ZEALAND (34° 30′-47° 30′ S., 166° 35′-178° 35′ E.), Brit. Dominion, S. Pacific Ocean; comprises the three islands known as North, South, and Stewart, and outlying Kermadecs, Chatham, Auckland, Campbell, Bounty, Cook, Savage, and Penrhyn Islands. Between North and South Islands is Cook Strait, between South and Stewart is Foveaux Strait. Coast-line is generally broken. Plains along E. coat; largest is Canterbury in South I. In North I. (44,468 sq. m.) volcanic mountain ranges run throughout—highest peaks, Ruapehu, 9,195 ft., Egmont, 8,300 ft.; drained by Waikato (from Lake Taupo, 238 sq. m.)

DOMINION OF
NEW ZEALAND
SCALE OF STATUTE MILES
0 50 100 150 200
Principal Railways
NORTH ISLAND
SOUTH ISLAND
T A S M A N
S E A
P A C I F I C O C E A N
Auckland
WELLINGTON
Christchurch
Dunedin
Invercargill
Napier
New Plymouth
Wanganui
Palmerston N.
Gisborne
Nelson
Greymouth
Hokitika
Timaru
Oamaru
Blenheim
Westport
Kaikoura
Lyttelton
Ashburton
Gore
Queenstown
Wanganui Bight
Cook Strait
Foveaux Strait
Canterbury Bight
Cook's Str.
Hauraki Gulf
Bay of Plenty
Hawke Bay
Taranaki Bight
Tasman Bay
Pegasus Bay
Banks Pen.
Kaikoura Pen.
Mt. Egmont
Mt. Cook
Mt. Aspiring
Mt. Earnslaw
Mt. Ida
Mt. Hikurangi
STEWART I.
SOLANDER I.
CODFISH I.
The World Syndicate Company, Inc., N.Y.
Longitude 172° East D from 174° Greenwich

Thames, Wairoa, North, Wanganui, Hutt, and other streams.

South I. (58,525 sq. m.) is traversed by mountains known as Southern Alps, and other ranges; highest peak, Mt. Cook or Aorangi (12,350 ft.); drained by Clutha, Molyneaux, Waitaki, Mataura, Grey, and other streams. Lakes are Te Anau (132 sq. m.), Wakatipu (112 sq. m.), and Manapouri.

Stewart I. (665 sq. m.) is mountainous; suffers from earthquakes and volcanic eruptions.

Largest towns are Wellington, Christchurch, Dunedin, Auckland. Climate varies, generally much warmer than that of U.K.; most rain on W. coast.

Principal wealth lies in vast numbers of sheep and cattle raised; great quantities of wool, frozen meat, and dairy produce exported. Horses and pigs are also bred, and wheat, oats, and other crops widely cultivated. Oranges, lemons, peaches, olives, and other fruits abound. Indigenous products include flax (*Phormium*), kauri pine, and many valuable timber trees; forest area estimated at 17,000,000 acres. Minerals include gold, coal, copper, silver, petroleum, iron, antimony. Exports also cereals, hides, kauri gum, fibre, tallow, etc. Imports clothing, machinery, tea, sugar, wines, etc. Railway (state) mileage, over 3,000.

There is no state religion. Education is free, secular, and obligatory. There is a univ. of New Zealand (Examining), and affiliated colleges at Dunedin, Auckland, Wellington, and Christchurch. The Canterbury Agritultural Coll. does good work. Pop. consists chiefly of persons of Brit. descent, but there are 46,000 Maoris.

Military service is compulsory between the ages of twelve and twenty-five; after Lord Kitchener's visit the New Defence Act, 1910, greatly improved the organization. For Navy, see p. 345.

New Zealand is administered by a gov.-gen., since 1917, assisted by a council of ministers; there is a Parliament of two houses—legislative council of 38 members and house of representatives of 80 members (including four Maoris); former are appointed, latter elected on adult suffrage. Labor legislation is far advanced; there is a Conciliation and Arbitration Act for settling disputes; most public works are nationalized or municipalized. Wellington is the capital.

Dutch explorer Tasman discovered islands, in 1642; they were circumnavigated by Captain Cook, in 1769, who made chart of coast and took formal possession for Britain, which, however, government did not confirm. In 1814, settlements were made by Brit. missionaries, whose efforts at civilizing natives met with some success. Colonization dates from 1825. In 1840, Maoris acknowledged Brit. sovereignty, and islands were once more annexed to Britain by Captain Hobson. New Zealand became autonomous, in 1852. Until 1864, seat of government was at Auckland, but in that year it was removed to Wellington. Various wars between colonists and Maoris took place, but these ended by 1870, since when peace has reigned. Changes in system of government were introduced in 1875. During Boer War, New Zealand sent troops to S. Africa in aid of Britain. New Zealand refused to join Commonwealth of Australia in 1900; became Dominion of New Zealand by Order in Council, in 1907. Area (including islands), 104,910 sq. miles. Pop. (including aborigines and island possessions), 1,219,000.

New Zealand and the World War.—In all, New Zealand provided for foreign service during the war 110,000 soldiers, or more than 10 per cent of the entire population. In addition, over 3,000 New Zealanders served in Brit. and Australian forces. The total casualties numbered nearly 17,000 killed and 60,000 wounded. Before the end of Aug., 1914, the New Zealand force, acting in conjunction with Brit. and Australian warships, took possession of Ger. Samoa. The first expeditionary force, consisting of 360 officers and 8,000 other ranks, was dispatched in Oct., 1914, to take part in the war in Europe. After some months' training in Egypt, during which part of the New Zealand force assisted in repelling a Turk. attack on the Suez Canal, Feb., 1915, the troops sailed for Gallipoli, April, 1915, taking part with the Australians in the landing at Anzac Cove, April 25, and in the subsequent operations in the Anzac sector. After the withdrawal, Dec., 1915, the New Zealand force returned to Egypt, and early in 1916, having received reinforcements, was reorganized as a complete division, which was transferred to France, April, 1916. In France, the New Zealanders took part in the first battle of the Somme, capturing Flers, Sept. 14, 1916; in the storming of the Messines ridge they occupied the village of that name, June 7, 1917; in the Flanders offensive they captured La Basse Ville, Aug. 1, 1917, and Gravenstafel in the attack on the Passchendaele ridge, Oct. 4, 1917; in the second battle of the Somme they recaptured Colincamps, N. of the Ancre, March 26, 1918; and in the battle of Amiens pushed the Germans across the Ancre at Beaucourt and occupied Puisieux and Serre, Aug. 15, 1918. A New Zealand tunnelling company, formed in 1916, carried out important subterranean works in the vicinity of Arras, and in

the final advance assisted to replace bridges destroyed by the retreating Germans. See Map of New Zealand.

NEY, MICHEL (1769-1815), Fr. general; Duke of Elchingen, 1808; prince of the Moskowa, 1812; N. rose from ranks; lieut. in army of North, 1792; general of division, 1799; marshal of France, 1804; won battle of *Elchingen*, which secured capitulation of Ulm, 1805; after *Friedland*, 1808; received from Napoleon description '*brave des braves*'; won battle of *Borodino* and led retreat from Russia, 1812; shot as traitor at Restoration; statue erected on spot, 1853.

NEZ PERCÉ, or **CHOPPUNISH INDIANS,** also known as the **NIMAPI** called Nez Percé (pierced nose) because of their custom in earlier days of piercing the nose for ornamental adornment. In 1777, they were led by their chief, Joseph, in a conflict against the forces of the Federal Government, Joseph following the unusual policy of not molesting white non-combatants. Most of them, about 1,500 in number, may now be found on their reservation in Idaho, less than a hundred others being on the Colville Reservation, in Washington.

NGAMI (20° 28′ S., 22° 50′ E.), formerly a large lake in N. of Kalahari Desert, S. Africa; now almost dry; its principal feeder was the Okavango or Kubango.

NGAN-HUI, NGAN-HWEI (32° N., 117° E.), fertile inland province, China; traversed by Yang-tze-Kiang and Hwai-ho; tea; capital, Ngan-King. Pop. 20,500,000.

NIAGARA (43° 15′ N., 79° 8′ W.), river, N. America, forming boundary between Ontario and New York; rises in Lake Erie and flows into Lake Ontario (*c.* 35 miles). At famous Falls river is divided by Goat Island, larger volume of water falling 158 ft. on Canadian side (Horseshoe Fall: breadth, 2,640 ft); American Fall, much narrower, is 162 ft. high. Below falls river enters chasm, and farther on are whirlpool and rapids.

NIAGARA FALLS, a city of New York, in Niagara co. It is on the Michigan Central, the Erie, the Lehigh Valley, the Grand Trunk, the New York Central, and other railroads, and on the Niagara River, 20 miles N. of Buffalo. Since the development of power from Niagara Falls it has been a very important industrial city. It has manufactures of flour, paper, carbide, carborendum, electro-chemical and electro-metallurgical products, planing mills, etc. Many of these industrial plants are operated by the power from the falls. The city is visited annually by thousands of persons who are attracted here by the falls and by the whirlpool rapids, about two miles below the falls. The city is the seat of De Veaux College, Niagara University, and several other educational institutions. There are also hospitals and a library. Pop., 1920. 50,760.

NIAGARA FALLS. — The Niagara River, flowing W. of N. from Lake Erie, on a smooth course for about 20 miles after half a mile of rapids and cascades, strikes an abrupt declivity and divides into two falls, the American, 167 ft. high, crest 1,060, and the Canadian, or Horseshoe Fall, 158 ft. high, crest 2,500 ft. and the largest body of water. Its crest is the boundary line between the United States and Canada. Luna Fall is a small offshoot of the American Fall, and behind it is the Cave of the Wind, wrought out by water erosion. The river below the falls flows between rocky cliffs for three miles to the Whirlpool, produced by the impact of two currents meeting. The New York State Reservation at Niagara Falls includes the S.W. part of the city of Niagara Falls, Goat Island, and some smaller islands. Queen Victoria Niagara Falls Park is under the Canadian Government. Water power from the falls was utilized for mills as early as 1725. The Niagara Falls Power Company was established in 1890, to secure power for electricity. The Niagara Falls Hydraulic Power and Equipment Company serves much the same purpose. There are two Canadian companies. Electric power is supplied to Syracuse, 165 miles away, and at Ottawa, 240 miles away.

NIAGARA, FORT (43° 17′ N., 79° 6′ W.), fortress, near estuary of Niagara R., on Lake Ontario, N. America; occupied by British, 1813-15.

NIAM-NIAM, African people of mixed descent, dwelling from the White Nile and the Shari nearly to the equator; estimated at 2,000,000, and including several quite distinct tribes.

NIAS (1° N., 97° 30′ W.), island, Dutch E. Indies, W. of Sumatra. Pop. 320,000.

NIBELUNGENLIED, High German heroic epic around the following tradition: King Gunter of Burgundy weds Queen Brunhilde with the help of Siegfried; Siegfried in turn weds Kriemhilde, Gunter's *s.* The two queens quarrel and Kriemhilde insults her rival. Hagen, a vassal of Gunter, avenges the insult by murdering Siegfried. Kriemhilde marries Etzel, king of the Huns, and with his aid treacherously annihilates the rest of her family (the *Nieblungen*), but is herself killed by Hagen, who

in turn succumbs to Hildebrand. Although of popular Ger. origin, the epic was preserved through Scandinavian channels, and has been colored by them, acquiring a definite form about 1200 under Kaiser Frederic I. It was lost after the XV. cent., but was rediscovered by Obereit and Bodner in the XVIII. cent., and reconstituted from later discoveries. It has formed the inspiration of several modern Ger. masterpieces, notably Hebbel's *Die Nibelungen* and Wagner's great series of musical dramas, *Der Ring der Nibelungen.*

NIBLACK, ALBERT PARKER (1859), an American naval officer; *b.* in Vincennes, Ind. He graduated from the Naval Academy at Annapolis, in 1880, saw service in the Spanish-American War and the Philippine Insurrection, and during the war against Germany he had command of the U.S. Naval forces based on Gibralter, and later of the American ships operating in the Eastern Mediterranean. During 1920-21, he was naval attache at the American Embassy, in London, and from 1921, he was in command of the U. S. Naval Forces in European Waters, with the rank of vice-admiral. He wrote *The Coast Indians of Alaska and Northern British Columbia, 1889.*

NICÆA, modern **ISNIK** (40° 30′ N., 29° 50′ E.), ancient city, on Lake Ascania, Bithynia, Asia Minor.

NICÆA, COUNCIL OF (325 A.D.), the first Ecumenical Council; the persecutions were over and Christianity was now state-established. The immediate object of the Council was to settle the Arian controversy. The bp's were mostly from the Eastern provinces. The Council refused to accept an Arian creed; a creed was brought forward by Eusebius of Cæsarea and in a modified form accepted by the Council. The majority were unwilling to see phrases formulated which were not in Scripture. Anthanasius took a leading part and the Emperor Constantine presided.

NICARAGUA (12° N., 85° W.), republic, Central America; is bounded N. by Honduras, E. by Caribbean Sea, S. by Costa Rica, W. by Pacific; Cordillera runs along S.W., 15 to 30 m. from coast; between mountains and sea is depression containing Lakes Managua and Nicaragua; to E. between base of hills and sea is extensive plain. Land is drained by Coco, Grande de Matagalpa, San Juan. A canal from Atlantic to Pacific, via the San Juan Valley and Lake Nicaragua, was early projected and operations actually begun, 1899, but the Panama route has prevailed. Chief towns, Managua (cap), Leon, Granada, Matagalpa. Subject to earthquakes; the climate varies with elevation, hot and damp near coast. Country produces mahogany and other valuable timbers, coffee, cacao, rubber, sugar-cane, fruit, gold, silver; stock raising and dairying important. Railway mileage, 172. Inhabitants include Europeans (very few), Indians, half-breeds. Administered by president, aided by council of five ministers; congress of two houses—40 deputies elected by universal suffrage, and 13 senators. Primary education is free and obligatory.

Nicaragua was sighted by Columbus, 1502; overrun by Gonzalez Davilo, 1522, and annexed by Spain, under whom it became prov. of Guatemala; rose against mother country and proclaimed independence, 1821; united with Central Amer. republic from 1823 to 1838, when it became separate state; warred against Britain, 1848, from whom it acquired Mosquito Coast, 1860; Indians of this coast protected by U.K. till 1906; warred against Honduras, 1907; dispute with U.S., 1909. In 1916, U.S. acquired canal route and naval bases on Bay of Fonseca and Corn I. for three million dollars. Area, 51,660 sq. miles. Pop., 1920, 638,119. See Map of Central America.

NICARAGUA CANAL. In 1884 a treaty was made between the governments of U. S. A. and Nicaragua with the object of cutting a ship canal to link up the Atlantic and Pacific Oceans. The canal was begun at Greytown in 1889, and its total length would have been about 170 m. including Lake Nicaragua and the San Juan R. Less than 30 m. would have had to be excavated. Operations were, however, suspended in 1893, and attention was directed to the Panama Canal, whose last barrier was blown away by dynamite in Oct. 1913, and the waters of the Pacific mingled with those of the Atlantic. The N. C., though it would have been a longer route, presented fewer difficulties in the way of natural barriers and fewer gigantic rocks to engineer and blast. The scheme was abandoned owing principally to the political unrest of the country.

NICASTRO (39° N., 16° 22′ E.), town, Catanzaro, Calabria, Italy. Pop. 18,500.

NICE, NIZZA (43° 44′ N., 7° 14′ E.), chief town in Alpes-Maritimes, France; beautifully situated on Mediterranean. A fashionable Riviera winter resort, N. is famed for its Promenade des Anglaise, Casino, Battles of Flowers, etc.; has cathedral, fort, and harbor; exports flowers, perfumes, fruits, olive oil, pottery, and carved olive-wood. Pop., 1921, 155,839.

NICENE CREED. See CREEDS.

NICEPHORUS I., Byzantine emperor, 802-11, after successful revolution against Irene.

NICEPHORUS II., PHOCAS, Byzantine emperor, 963-69; famous conqueror; assassinated by wife in conjunction with his *nephew*, John Zimisces.

NICEPHORUS III., BOTANIATES Byzantine emperor, 1078-81; with Turk. help deposed predecessor, Michael VII.; deposed by Alexius Comnenus.

NICHOLAS, GRAND-DUKE, (1856), Russian soldier; *uncle* of Tsar Nicholas II.; entered the General Staff School at Petrograd, 1873; took part in the Russo-Turk. War, 1877; held cavalry commands becoming inspector-general; appointed president of council during the revolutionary disturbances, 1905, and commander-in-chief of the Imperial Guards and the Petrograd military district; at the outbreak of the World War took command of the Russian armies on hte Austro-Ger. front and decided on an immediate offensive, which, after brilliant initial success, 1914, was turned to retreat and defeat, 1915; proved himself a skilful strategist; removed from command and succeeded nominally by the emperor, Aug., 1915; appointed governor of the Caucasus, 1916, and achieved further success in command of the the Russian army on that front; after the Russian Revolution, 1917, retired to the Crimea, and subsequently emigrated to Italy.

NICHOLAS (1841-1921), ex-King of Montenegro; succeeded in 1860 as hereditary prince, and assumed title of king, in 1910; reformed army, civil administration, and educational system of Montenegro; he fought against Turkey, 1862, 1876, 1877-8, and took first step in Balkan War of 1912; is an author of some note, his poems, ballads, etc., having a recognized place in modern Balkan literature. In early stages of World War he threw in his lot with Serbia against Austria, but capitulated, Jan., 1916, and left the country. Jugo-Slav propagandists allege that Montenegrin forces were unable, through intrigue, to defend Mt. Lovtchen against the Austrains, and the Montenegrin Grand Assembly in Nov. 1918 passed a resolution dethroning King Nicholas, and proclaiming union of Montenegro with Jugo-Slav kingdom of Serbs, Croats, and Slovenes.

NICHOLAS I. (1796-1855), Tsar of Russia; m. *dau.* of Emperior Frederick William III., 1817; declared heir of his *bro.*, Alexander I., 1823, Constantine being passed over at his own request. N. made Holy Alliance with Austria and Prussia, 1833, of which secret purpose was crusade against revolutions; it became Quadruple Alliance by accession of Britain, 1840, Russia temporarily abandoning Turk. aims; refused to acknowledge Napoleon III., and alienated remaining powers by attack on Turkey; sustained crowning disaster in Crimean War.

NICHOLAS II., (1868-1918), Emperor of Russia, succeeded his father Alexander III., 1894, and in the same year married the Princess Alexandra Alix of Hesse; made alliance with France, and originated the Hague Conference for promotion of universal peace, 1899; unwisely roused Japan by Eastern policy and sustained humilating defeat; under pressure of popular agitation granted a constitution in 1905, and after some trouble the constitutional experiment seemed to work successfully. On the outbreak of the World War the Tsar placed himself at head of enthusiastic national movement of resistance to Central Powers, and in 1915, assumed command of armies but forces of popular government gradually gained strength. Distrust of the influence of the Tsarina, mismanagement of the military operations against Germany, and maladministration of supplies of the empire added to general discontent, and in March, 1917, Nicholas, whose conduct throughout had been that of an honest, if weak, man, abdicated and retired to his estate in the Crimea. Later in the month he was arrested and taken as a prisoner to Tsarskoye Selo, afterwards being removed to Tobolsk and later to Ekaterinburg, where he was murdered, with the Tsarina and his family, by Bolsheviks (July 1918. See also RUSSIA (*History*).

NICHOLAS I., THE GREAT, pope, 858-67; greatly increased prestige of papacy; reduced archbishopric of Ravenna, 861-64; recognized False Decretals and used their power in summoning Hincmar and Rothade to Rome, 863, and denying independent action to councils; quarrelled with Gk. Church.

NICHOLAS II., pope, 1058-64; Lateran Council, 1059, settled mode of elect-popes; made alliance with Normans of Apulia.

NICHOLAS III., pope, 1277-80; successfully opposed house of Anjou; bull, 1279, settled disputed points in rule of St. Francis.

NICHOLAS IV., pope, 1288-92; pious Franciscan, unequal to secular government.

NICHOLAS V., antipope, 1328-30.

NICHOLAS V., pope, 1447-55; humanist and statesman; pope at time of Turk. capture of Constantinople.

NICHOLAS, HENRY (*c.* 1501-*c.* 1580) founder of the religious sect called the Family of Love; *b.* in Münster. The sect was Anabaptist, and tended towards rationalism.

NICHOLAS OF BASEL (*d.* 1397), Ger. heretic; taught Quietism; akin to mystics of Beghard brotherhood; Schmidt's identification of N. with Merswin's 'God's friend in the Oberland' now rejected; burned to death.

NICHOLAS OF DAMASCUS (*c.* 74 B.C.), a Greek historian, poet, and philosopher, born in Damascus. While still a boy he composed tragedies which were performed at Damascus. He was the friend and possibly secretary of Herod, King of Judæa, whom he accompanied to Rome in 13 B.C., when he won the favor of Augustus. Among the works attributed to him, besides the collection of tragedies and comedies, are a *History of Assyria; Lives of Augustus and Herod; History of the World; Book of Principles; Book of the Soul.*

NICHOLAS, ST., famous saint believed to have lived under Constantine; *bp.* of Myra, Syria; his feast-day is Dec. 6; as *Santa Claus* became identified with Christmas festivities; patron of Russia, of children, and of seafarers; subject of many legends in many lands. St. Nicholas is one of the most popular Saints of the Greek Church.

NICHOLAS, SIR EDWARD (1593-1669), Eng. statesman; foremost adviser of Charles I. in Civil War, arranging treaty of Uxbridge, surrender of king to Scots, surrender of Oxford.

NICHOLL, WILLIAM EVAN (1883) College Dean; *b.* at Moosomin, Saskatchewan, Canada. Graduated from Bellevue College in 1904. Teacher in history and education at Hastings College, Nebraska, in 1909-1910, instructor and principal of an academy from 1910-1911. At Bellevue College, since 1911 as professor of education. In 1912-1915, registrar and trustee; 1914-1916, acting president, acting associate professor of education of Indiana University. In 1918, at Camp Funston, Kansas, as camp educational director of the Army Y. M. C. A. From July, 1918 to July, 1919, director of training western department of Army Y. M. C. A. Since 1919, dean of Pomona College.

NICHOLS, EDWARD LEAMINGTON (1854), an American physicist, *b.* in Leamington, England, of American parents. He graduated from Cornell University, in 1875, then continued his studies in the universities of Berlin, Leipzig and Gottingen, after which he served a year as assistant in Thomas Edison's laboratory in Menlo Park. He was professor of physics and chemistry at the Central University of Kentucky (1881-3), of physics and astronomy at the University of Kansas (1883-7), and of physics at Cornell University (1887-1919), being professor emeritus since 1919. Among his works are "*The Galvanometer, 1894; Outlines of Physics, 1897; Studies in Luminescence,* with Prof. Merritt, 1910, and *Fluroescence of the Uranyl Salts,* with Prof. Howes, 1919.

NICHOLS, ERNEST FOX (1869), an American college professor, *b.* at Leavenworth, Kan., son of Alonzo Curtis and Sophronia Fox Nichols. He was educated at Kansas Agricultural College, Cornell University, the University of Berlin and at Cambridge University. After being a professor of physics at various American colleges and universities including Yale from 1916-20, he was director of pure science at the Nela Research Laboratories and the National Lamp Works, at Cleveland, Ohio, during 1920-21, and was president of Mass. Inst. Tech. from March to November, 1921. He contributed to scientific journals in the United States and abroad and was the collaborator of the Astrophysical Journal.

NICHOLS, ROBERT HASTINGS (1873), Professor of church history; *b.* at Rochester, New York. In 1894, graduated from Yale University. In 1901, ordained a Presbyterian minister, and was pastor at Unadilla, New York, 1901-1902. Trinity Church, South Orange, New Jersey, 1902-1910. In 1910-1913, assistant professor of church history and since 1913, professor at Auburn Theological Seminary. A commissioner to the General Assembly of the Presbyterian Church, 1907-1910. Stated clerk, 1907-1910 of the Presbytery of Orange and Morris. Author of: *The Growth of the Christian Church, 1914.* President in 1920, of the American Society of Church History.

NICHOLS, SPENCER BAIRD (1875), Artist; *b.* in Washington, District of Columbia. Student at Corcoran Art Gallery, and the Art Students League, Washington. Teacher of illustrating at Art Student's League. In the House of Representatives a portrait painted by him for the United States Government of

Andrew Stephenson. At the Central Presbyterian Church, New York City, the mural decorations. Awarded 3rd Corcoran Prize at the Society of Washington Artists in 1901. In Spanish-American War as member of Company F, 3rd Regiment Engineers.

NICHOLS, WILLIAM FORD (1849), American bishop; *b.* in Lloyd, New York, June 9, 1849. He graduated from Trinity College, Conn., 1870, Berkeley Divinity School, 1873, (D.D. Trinity, 1888). Ordained priest, Protestant Episcopal Church, 1874. Private secretary to Bishop Williams of Connecticut, 1871-1876. Assistant Holy Trinity Church, Middletown, Conn., 1873-1875. Rector St. James, West Hartford, and Grace Church, Newington, Conn., 1875-1877. Christ's Church, Hartford, 1877-1887. St. James, Philadelphia, 1887-1890. Professor of Church History, Berkeley Divinity School, 1885-1887. Consecrated assistant-bishop of California, June 24, 1890. Bishop of California, April 6, 1893. Assistant-secretary House of Bishops, 1886. Author: *On the Trial of Your Faith* (Episcopal charge), *1895*; *A Father's Story of the Earthquake and Fire of 1906; Counsels to Candidates for Holy Orders, 1909*; *Some World Circuit Saunterings, 1913.*

NICHOLSON, THOMAS (1862), an American Methodist-Episcopal bishop; *b.* in Woodburn, Ontario, Canada. He graduated from Northwestern University, in 1892, after having taught school for a number of years, then entered the Methodist-Episcopal ministry. After holding various charges in Michigan, he became professor of philosophy and Biblical literature, and principal of the academy, of Cornell College, in Iowa, during 1894-1903, after which he was president of Dakota Wesleyan University. During 1908-16, he was general corresponding secretary of the Board of Education of the Methodist-Episcopal Church, at the end of which period he was elected bishop. He has written *The Necessity for the Christian College, 1904*; and *Studies in Christian Experience, 1907.* During 1921-23, he was president of the Anti-Saloon League.

NICHOLSON, FRANK WALTER (1864), College Dean; *b.* at Sackville, New Brunswick, Canada. In 1883, graduated from Mount Allison College, Canada. At Mount Allison College from 1883-1884, as tutor in French and English. At Harvard, instructor in Sanskrit, 1999-1889 and Latin, 1889-1891. A tutor in Latin, 1891-1894; instructor, 1894-1895; associate professor, 1895-1913; and since 1913, professor; 1895, secretary of the faculty; 1918, dean of Wesleyan University. Editor of: *The Phormio of Terence, 1890*; *The Plutus of Aristophanes, 1896*; *Catalogue of Connecticut Gamma*; *Phi Beta Kappa, 1906*; *Alumni Record of Wesleyan University, 4th edition, 1911*; *5th edition, 1921.*

NICHOLSON, JOHN (1822-57), Brit. general and administrator; served in Sikh Wars; deputy-commissioner of; Bannu on annexation of Punjab, 1849; crushed attempted mutiny of Punjab insisted on, and carried out, attack on Delhi; slain after entry; brilliant ruler, despotic but just; called by Lord Roberts '*beau idéal* of a soldier and a gentleman.'

NICHOLSON, MEREDITH (1866), an American author; *b.* at Crawfordsville, Ind., son of Edward Willis and Emily Meredith Nicholson. He was educated in public schools in Indianapolis. Author of: *Short Flights* (poems), *1891*; *The House of a Thousand Candles, 1905*; *The Port of Missing Men, 1907*; *The Little Brown Jug at Kildare, 1908*; *The Siege of the Seven Suitors, 1910*; *Otherwise Phyllis, 1913*; *The Proof of the Pudding, 1916*; *The Madness of May, 1917*; *A Reversible Santa Claus, 1917*; *The Valley of Democracy* (essays), *1918*; *Lady Larkspur, 1919*; *Blacksheep! Blacksheep! 1920*; *The Man in the Street* (essays), *1921*; and the play *Honor Bright* (with Kenyon Nicholson), *1921.*

NICHOLSON, SAMUEL D., United States senator; *b.* in Prince Edwards Isle, Canada. Educated at public schools Prince Edwards Isle, and Bay City, Michigan. In 1881, he settled in Leadville, Colorado, and became prominent in mining affairs. President and general manager of Western Mining Company, director of Denver National Bank, and of Leadville, and other banks. Mayor of Leadville for two terms, 1893-1897. Elected Republican United States senator 1921-1927.

NICHOLSON, THOMAS (1862); American bishop; *b.* in Woodburn, Ontario, January 27, 1862. Graduated at Toronto Normal School, 1883; Northwestern University, 1892; Garrett Bible Institute, 1892; (D. D. Iowa Wesleyan University, 1892; Garrett Inst., 1906; LL.D. Cornell College, Ia., 1907.) Ordained Methodist Episcopal minister, 1884. Pastor of Michigan churches, 1884-1889; Professor of Philosophy and Bible literature, Cornell College, Ia., 1894-1903; Professor and president, Dakota Wesleyan University, 1903-1908; Elected bishop of M. E. Church, May, 1916; President the South Dakota Teacher's Association, 1899. Editor, State High School Manual. Author of: *The Necessity of Christian Colleges, 1904*;

Studies in Christian Experiences; editor: *The Christian Student*; President Anti-Saloon League, 1921-1923.

NICIAS (V cent. B. C.), Athenian statesman and soldier; succ. Pericles as leader of aristocratic faction; opposed Cleon; helped to arrange *Peace of Nicias*, 421 B. C.; app. general in Syracusan expedition, 415 B. C.; proved himself incompetent, over-cautious, and superstitious; killed, 414; a man of no genius, popularized by minor successes and lavish distribution of wealth.

NICKEL (Ni=58·68), metallic element in iron group; occurs as kupfernickel (NiAs), n. glance (NiAsS), and frequently with iron and cobalt. Obtained by roasting sulphide to oxide, and reducing with charcoal. Purified by forming n. carbonyl ($Ni(CO)_4$), a volatile, easily decomposable liquid. Silvery white, hard, may be rolled and polished; difficult to oxidise; S.G. 8·9; M.P. 1484°; used for plating (Electrolysis of $NiSO_4$, $(NH_4)_2SO_4$, $6H_2O$ solution), for alloys (German silver, coinage), and for nickel steel (armour plates, guns).

NICKEL-PLATING, see ELECTRICITY (Electro-plating).

NICOBAR ISLANDS (8° N., 93° E.), group of 19 islands in Ind. Ocean, belonging to Great Britain. Chief islands are Great and Little Nicobar, Camorta, Nancowry, and Car Nicobar; total area, 635 sq. miles; large forests; climate unhealthy; administered by the Chief Commissioner of the Andamans; first taken by Danes, 1756; Austrians, 1778; British, 1869; chief exports—coconuts, edible birds' nests. Natives are of Malay type. Pop. *c.* 7000.

NICOLAY, JOHN GEORGE (1832-1901), an American public official; *b.* in Essingen, Bavaria. Early in life he came to the United States and learned the printing trade in Illinois. Afterwards he became private secretary to President Lincoln. He was consul at Paris from 1865 to 1869, and from 1872 to 1887 was marshal of the Supreme Court. He wrote: *The Outbreak of the Rebellion*, and with John Hay, the most comprehensive and authoritative life of Abraham Lincoln. He also edited Lincoln's complete works.

NICOLE, PIERRE (1625-95), Fr. theologian; one of most illustrious prof's at Port Royal; trans. *Provinciales* into Latin, but became estranged from Janenists; wrote *Essais de morale*.

NICOLL, SIR WILLIAM ROBERTSON (1851-1922), Scot. author and critic; started the *British Weekly*, *1886*, and the *Bookman*, *1891*, both of which he continues to edit; pub. *Literary Anecdotes of the Nineteenth Century*, *1895*; *Letters on Life*, *1901*; *The Daybook of Claudius Clear*, *1905*; *Life of Ian Maclaren*, *1908*; *Emily Brontë*, *1910*; edited the *Expositor's Bible*, the *Clerical Library*, the *British Monthly*, *since 1900*; and a complete edition of the Works of Charlotte Brontë; also joint-editor of an *Illustrated History of English Literature*.

NICHOLSBURG, (48° 49′ N., 16° 38′ E.) Bohemian MIKULOV town, Moravia, Austria; vineyards.

NICOMEDIA, (40° 45′ N., 30° E.), modern ISMID ancient city, Bithynia, Asia Minor; founded in 264 by Nicodemes I., king of Bithynia; residence of several Rom. emperors; scene of Hannibal's death.

NICOPOLIS, ACTIA NICOPOLIS, ancient city, Epirus, Greece; founded by Octavian in commemoration of his victory at Actium, 31 B. C.

NICOSIA (1) 35° 12′ N., 33° 10′ E.); capital of Cyprus, on Pedius; seat of Gk. abp.; manufactures leather, textiles. Pop. 17,000. (2) (37° 42′ N., 14° 25′ E.), town, Catania, Sicily. Pop. 18,500.

NICOTINE ($C_{10}H_{14}N_2$), colorless alkaloid oil in tobacco; B.P. 241° C., pungent smell, soluble in water and alcohol, very poisonous. Diacid base forming crystalline salts, *e.g.* $C_{10}H_{14}N_2$, 2HCl.

NICTHEROY, NITEROY (23° 52′ S., 42° 52′ W.), town, Rio de Janeiro, Brazil, S. America; manufactures textiles, soap, tobacco. Pop. 87,800.

NIEBUHR, BARTHOLD GEORG (1776-1831), Ger. historian; *b.* Copenhagen; held several public posts, but chiefly important as author of *Roman History* (*Römische Geschichte*); first two vol's pub. 1812, third vol. after death.

NIEBUHR, KARSTEN (1733-1815), Ger. geographer to Dan. Arab. Exploration Soc.; his fellow-travellers died, and N. continued expedition alone; returned, 1767, and wrote valuable accounts of travels.

NIEDERBRONN (48° 56′ N., 7° 40′ E.), town, Alsace-Lorraine, Germany; mineral springs.

NIEDERLAHNSTEIN (50° 20′ N., 7° 36′ E.), town, Hesse-Nassau, Prussia, at junction of Lahn and Rhine; manufactures machinery. Pop. 4000.

NIEDERWALD (49° 59′ N., 7° 54′ E.); mountainridge, near Rhine, Germany; site of a national monument to com-

memorate Ger. victory over France in 1870-71.

NIEDER-SELTERS (50° 18′ N., 8° 15′ E.), village Hesse-Nassau, Prussia; 'Seltzer-water' springs.

NIEHAUS, CHARLES HENRY (1855-), an American sculptor, born at Cincinnati; *s.* of John Conrad and Sophia Block Niehaus. He was educated in the Cincinnati Schools and later studied art at the Royal Academy, Munich, Ger., where he won the first medal ever given to an American. He executed many statues and busts and won several medals and awards. Some of his principal works are: *Ingalls, Allen, Garfield* and *Morton*, in rotunda of Capitol, at Washington; *statues of Gibbon* and *Moses*, Congressional Library; Astor Historical Doors, Trinity Church, New York, and John Paul Jones monument, Washington.

NIELSEN, ALICE (1876), an American prima donna, born at Nashville, Tenn., *dau.* of Erasmus Ivarius and Sarah A. Nielsen. She received her muscial education under Mlle. Ida Valerga, San Francisco. After the death of her first first husband, Benjamin Nentwig, she married Le Roy R. Stoddard, M.D., of New York. She made her first appearance with an opera company at Oakland, Cal., and later played various engagements including in *The Fortune Teller*, in London, in 1902. She then studied for grand opera in Rome and made her first appearance in grand opera at Bellini Theater, Naples, Italy, as Marguerite in *Faust*, after which she played leading roles in many operas in Europe and the United States, including engagements with the Metropolitan Opera Co.

NIEM, DIETRICH OF (*c.* 1345-1418), Ger. chronicler; abbreviator in papal chancery; advocated general council to end great schism and upheld Empire against Papacy; works important for ecclesiastical history.

NIEMBSCH VON STREHLENAU, Austrian poet, known by pseudonym Nicolaus Lenau.

NIEMEN, OR MEMEL, a large river rising in Russia and flowing through Poland. It finally enters East Prussia. It is about 650 miles in length and is navigable as far as Grodno. The territory through which it passes was the scene of much fighting during the World War. See WORLD WAR.

NIENBURG-ON-THE-SAALE (51° 50′ N., 11° 45′ E.), town, on Saale, duchy Anhalt, Germany; iron foundries. Pop. 6,000.

NIENBURG-ON-THE-WESER (52° 38′ N., 9° 15′ E.), town, on Weser, Hanover, Prussia; glass-works. Pop. 10,000.

NIERSTEIN (49° 52′ N., 8° 20′ E.), town, on Rhine, Hesse-Darmstadt, Germany; wines. Pop. 4,500.

NIETZSCHE, FRIEDRICH WILHELM (1844-1900), Ger. philosopher; believer in Darwinism; brute strength, cunning, etc., are exalted as leading to success in the struggle for existence; the Christian virtues should be superseded, as tending to the prolonged existence of less vigorous types; apostle of gospel of Superman. Chief work, *Thus Spake Zarathustra.*

NIEUPORT (Flem. *Nieuwpoort*), small tn., on Yser, W. Flanders, Belgium (51° 8′ N., 2° 44′ E.), shipbuilding and fisheries. Pop. 3,600. After the retreat from Antwerp the Belgian troops took up positions on the line of the Yser and defended Nieuport against the heavy attacks of the Germans, ultimately flooding the country E. of the railway between Nieuport and Dixmude, Oct. 27, 1914; subsequently Belgian and Fr. troops advanced to St. Georges, 2 m. E. of Nieuport, Dec. 28, 1914. By a sudden local offensive the Germans regained ground between Nieuport and the sea, July 9, 1917.

NIÉVRE (47° 10′ N., 3° 30′ E.), central department, France; area, 2658 sq. miles; mountainous in E.; drained by Allier, Loire, Yonne; large forest area; live stock raised; coal, iron and steel manufactures. Pop. (1921) 270,148.

NIGDEH, NIGDE (37° 58′ N., 34° 40′ E.), town, Konieh vilayet, Asia Minor. Pop. 21,000.

NIGEL (*d.* 1169), bp. of Ely, 1130; prominent for work in Exchequer under Henry II.

NIGER (4° 25′ N., 6° E.), large river of West Africa; rises in plateau of Futa Jallon in Fr. Guinea; flows N. and N. E. through Fr. Sudan, turning S. E. at Barka, flows through Nigera and enters Gulf of Guinea by numerous mouths, Rio Nun at Akassa being the chief one; total length, 2,600 miles, of which over 1,050 are navigable; area of basin, 584,000 sq. miles. Swampy delta extends about 120 miles along coast, and covers an area of 14,000 sq. miles. Chief tributaries are Benue, Sokota or Rima, and Kaduna; principal towns, Bammako, Sasandig, Timbuktu, Ansango, Ilo, Gambo, Busa, Lokojo, Asaba, Abo, Rabba, Egga; N. is known under various names (Goliba, Isa, Quorra, etc.); first dis-

covered and explored by Mungo Park, 1795; followed by Clapperton, 1826, R. and J. Lander, 1830; Richardson, Barth, 1851-54; Flegel, 1880-81; Gallieni, Caillié, Boyd Alexander, etc.

NIGERIA, Brit. colony and protectorate, W. Africa (10° N., 8′ E.); consists of *Northern Nigeria* and *Southern Nigeria* (including Lagos Protectorate). Nigeria is bounded on N. by Fr. Sudan, W. by Dahomey, E. by Lake Chad and Kamerun, and S. by Gulf of Guinea. Boundary between Northern and Southern Nigeria runs from 9° N. in W. to 7° N. in E. Coast region is flat and swampy, with hot and unhealthy climate, malaria being very prevalent; northern part fertile, with healthier climate; interior traversed by mts.; highest ranges, 6,000 to 7,000 ft.; immense valuable forests. Chief rivers are Niger, Benue, Sokoto, Kaduna, Waube or Yo, Cross, Katsena, Gongola; principal towns, Lagos (cap.), Kano, Sokoto, Asaba, Onitsha, Benin, Abo, Zungeru Kaduna (chief town in Northern Nigeria), Maifoni, Abeokuta, Ibadan, Illorin, Gebba, Bussa, Gando; Akassa, Brass, Bonny, Warri, Barutu, Calabar, Sapele, Opobo, Forcados, on or near coast. Fauna consists mainly of elephants, lions, giraffes, hyenas, monkeys, and many species of antelope; rivers infested by crocodiles, hippopotami, and rhinoceri. Principal products are palm oil, kernels, rubber, timber, ivory, cotton, kola-nuts, indigo, coffee, cocoa, tobacco, ostrich feathers, shea-butter, gums, live stock; silver, manganese ore, tin, lignite, iron, lead ore, salt, and soda are found. A colliery has been opened at Udi in the southern provinces. See Map of Africa.

Region was discovered by Portuguese (XV. cent.); Brit. traders gradually acquired predominating share of trade; National African Co. established 1879; acquired rights over Nigeria, and in 1886, obtained royal charter as *Royal Niger Co.*; Benin massacre and expedition, 1897. Niger Co. surrendered political administrative rights, 1900, and Protectorates of Northern and Southern Nigeria were formed; Lagos made Western province of Southern Nigeria, 1906—other provinces, Eastern (headquarters, Calabar) and Central (headquarters, Warri); Sir Frederick Lugard appointed high commissioner of both Northern and Southern Nigeria with a view to their federation, 1912. In 1914, the two were united as the 'Colony and Protectorate of Nigeria,' under a governor. The boundaries of the colony were freshly defined, and the Protectorate divided into Northern Provinces and Southern Provinces, each under a lieutenant-governor, subject to the governor's control and authority. Native rulers have suppressed slave-markets, and slave-dealing is now practically non-existent. Nigeria was explored by Mungo Park, Major Denham and Clapperton, R. and J. Lander, Richardson, Dr. Barth, etc. Local administration is conducted by Brit. Residents, native kings and chiefs. Rivers and roads are chief means of communication, but railways (mileage in 1918, 1,110) are being extended, 430 m. being under construction. Two railways have ocean ports. Native tribes are mostly negroes—Ibo, Idzo, Aros, Efiks, Borgus, Jukos, Garubas, Fulas, Hausas, etc. Mohammedanism is widely spread, especially in N., but cannibalism still prevails in some parts. Nigeria responded liberally to calls for men in the World War. Forces were employed in Kamerun and E. Africa. Area, *c.* 332,000 sq. m.; pop. 16,250,000. See KAMERUN.

NIGHTINGALE, see under THRUSH FAMILY.

NIGHTINGALE, FLORENCE (1820-1910), Eng. philanthropist; showed strange power over animals as child; hospital training; took out staff of nurses to Crimea, 1854, and performed heroic services; revolutionised hospital nursing (*q. v.*) at home, founded N. Home, and spread knowledge of hygiene of good social position and exercised enormous influence.

NIGHTMARE, OR INCUBUS, a condition which is characterized by an abiding sense of discomfort and uneasiness, occuring in the midst of a disturbed sleep.

NIGHTSHADE, a term comprising two species, included in the *Solanaceæ*—*Atropa belladonna*, the deadly n., from which belladonna (*q.v.*) is obtained, and the bittersweet, which is only slightly poisonous.

NIHILISM, name of species of revolutionary propaganda in Russia. Word first appears in Turgueniev's *Fathers and Sons, 1862*; for spirit which turns critical eye on all human institutions; later appropriated to political destructiveness of physically violent kind. Disappointed by reign of Alexander II., Russ. Liberals began in 1871, to organize revolts against government; the literary movement had been confined to prosperous classes, who now began to preach to people with *Subterranean Russia* for organ; procession at Moscow, 1877; persecuted, imprisoned, or sent to Siberia; 1878-80, were years of Nihilist Terror, and after two vain attempts Alexander II. was slain by bomb, 1881; prominent place taken by women in these attempts; Alexander III. nearly

stamped out movement by secret police system and severe punishments.

NIIGATA (37° 57′ N., 139° 3′ E.), seaport, Echijo, Japan, on W. coast; lacquer-ware. Pop. (1919) 97, 274.

NIIHAU, see HAWAIIAN ISLANDS.

NIJAR (36° 54′ N., 2° 15′ W.), town, Almeria, Spain. Pop. 15,500.

NIJMEGEN, NIJMWEGEN, NIMEGUEN (51° 51′ N., 5° 33′ E.), city, on Waal, Gelderland, Netherlands; Roman *Noviomagus*; contains Church of St. Stephen, 1272, Renaissance town hall, and ruined Carolingian palace; tobacco, metal-work. Pop. (1921) 66,899.

NIJNI-NOVGOROD, see NIZHNI-NOVGOROD.

NIKAYA, group of Buddhist canonical lit.; *Sutta Pisaka* is composed of four chief N's, mainly dialogues.

NIKKO (*c.*37° N., 137° 30′ W.), district, Japan; an important religious center and place of pilgrimage; many Shinto and Buddhist shrines and temples.

NIKOLAYEV (47° 7′ N., 30° 31′ E.), town, Kherson, Russia; important naval station; fortified; has Gk. cathedral, observatory, naval arsenal; manufactures flour, iron goods, etc. Pop. 95,000.

NIKOLAYEVSK.—(1) 52° N., 48° 40′ E.), town, on Irgiz, Samara, Russia. Pop. 13,600. (2) (52° 53′ N., 140° 22′ E.) fortified town, on Amur, former capital, E. Siberia. Pop. 5,500.

NIKOLAYEVSKAYA SLOBODA (50° 5′ N., 45° 30′ E.) town, on Volga, Astrakhan, Russia; trading center. Pop. 19,000.

NIKON (1605-81); Russ. patriarch, 1653; revised Slavonic service-books.

NIKOPOL (47° 32′ N., 34° 40′ E.), town, Ekaterinoslav, Russia. Pop. 8,000.

NIKOPOLI, NICOPOLIS (43° 42′ N., N., 24° 53′ E.), town, on Danube, Bulgaria; defeat of Sigismund of Hungary by Turks, 1396. Pop. 6,200.

NIKOSIA, see NICOSIA.

NIKSHICH, NIKSHITCH, NIKSIC (42° 45′ N., 18° 57′ E.), fortified town, Montenegro; taken from Turks by Montenegrins in 1877. Pop. 5,300.

NILE, river of Africa; has its farthest source in the Nyavolonga and the Akanyaru, headstreams of the riv. Kagera, which rises between 2° and 3° S, and enters Lake Victoria. From this lake, the river proceeds N as far as Gondokoro (5° N), the usual limit of navigation, and about 10° N it is joined by the Bahr-el-Ghazal and the Sobat; from this point to Khartum it is called the Bahr-el-Abiad, or White Nile. Here it is joined by the Bahr-el-Azrek (Blue Nile), and the united stream flows in a long, narrow valley to Cairo, and thence through a delta to the Mediterranean sea. Below Khartum it receives only one trib, the Atbara (Black Nile), which drains N. Abyssinia. The Nile is the second longest riv. in the world, being *c.* 4,000 m. in length, or 3,470 m. from its outlet in Lake Victoria; and but for two great interruptions, it is navigable for its entire course. Sudd (floating vegetation) hinders navigation on Upper Nile. Its basin is *c.* 1,100,000 sq. m. Between Wady Halfa and Khartum there are five cataracts, or rather series of rapids. Until 1902, there was a cataract at Assuan, but this has been done away with by the construction of the great reservoir and dam at Shellâl. In 1907, further work on the dam increased its height by 26 ft., and thus enabled it to hold water to a depth one-third greater than before. The reservoir and barrage at Assuan afford irrigation to over 650 sq. m. of land. The Libyan desert lies to the W., and the Arabian and Nubian deserts to the E. of the river.

The Nile enters the Mediterranean sea by two principal distributaries, the Rosetta and Damietta branches. Once every year the Nile overflows its banks, and deposits upon the land a black and very fertilizing mud, upon which all the crops in Egypt depend. About the end of April the rise is perceived at Khartum, where the Blue Nile from Abyssinia joins the White Nile, but it is not until towards the end of June that its effects are felt at Cairo. During three months the overflow continues, reaching its maximum (the average rise at Cairo is *c.* 23 ft.) in Sept., when it remains practically stationary until towards the end of Oct.; after this it slowly but steadily subsides. The Nile floods depend on the rainfall of the Abyssinian highlands. Formerly cultivation could only be after the annual floods, but with the aid of regulating dams at Assiut, near Cairo, and at Zifte and Esneh, high-level canals supply water when the normal volume of the river is insufficient for cultivation. In 1770, Bruce discovered the sources of the Blue Nile in Lake Tana in Abyssinia. In 1858, the Victoria Nyanza was discovered by Speke, and in 1889 the Albert Edward Nyanza by Stanley.

NILE, BATTLE OF THE (1798), fight between Brit. and Fr. fleets in Bay of Aboukir. Hearing of Fr. appearance at Malta, Nelson rightly judged Egypt to

be its secret destination, but, arriving at Alexandria before the Fr. fleet, supposed he had made error, and sailed away; returned to find French in possession, but surrounded Fr. fleet in Aboukir Bay at mouth of Nile, and destroyed it. Napoleon for months was thus cut off from France.

NILE DAM, see DAMS.

NILES, a city of Michigan, in Berrien co. It is on the Cleveland, Cincinnati, Chicago and St Louis, and the Michigan Central railroads, and on the St Joseph river. Its industries, which are important, include the manufacture of paper, furniture, steel products, farm tractors, flour, etc. There is a public library. Pop. (1920) 7,311.

NILES, a city of Ohio, in Trumbull co. It is on the Erie, the Pennsylvania, and the Baltimore and Ohio railroads, and on the Mahoning river. It is an important manufacturing city and its industries include the making of sheet steel products, automatic presses, boilers, steam and electric cars, foundry products, blast furnace products, mill supplies, etc. The city is the birthplace of President McKinley and a handsome memorial has been erected here to his memory. There is a public library. Pop. (1920) 13,080.

NILGHAI (*Boselaphus tragocamelus*), an Ind. antelope, with maned neck, and fore limbs longer than hind; only the male with horns.

NILGIRIS, THE, NEILGHERRIES (11° 25′ N., 76° 45′ E.), plateau, Deccan, India; highest point, Mt. Dodabetta, 8,760 ft. The district has area 956 sq. miles. Pop. 115,000.

NILSSON, CHRISTINE, COMTESSE DE MIRANDA (1843-1922), Swed. soprano vocalist and prima donna; made her début at the Théâtre Lyrique, Paris 1864, and came to England, 1867, where she appeared every year till her retirement from the operatic stage, 1881; made several successful tours in America, and was the creator of important rôles in various operas—*e.g.*, *The Magic Flute*, *Martha*, *Don Juan*, *Faust*, *Robert the Devil*, and *Lohengrin*.

NIMAR (21° 45′ N., 76° 30′ E.), district, Nerbudda, Central Provinces, India. Pop. 335,000.

NIMBUS, in art, a halo.

NÎMES, tn., Gard, France (43° 51 N., 4° 21′ E.); silk, cotton, shawls, hosiery, machinery, carpets, wine and brandy trade; has magnificent Roman remains; Maison Carrée, finest extant example of Græco-Roman architecture; huge amphitheatre, Tour Magne, Temple of Diana; Roman Baths once supplied by superb Pont du Gard. Augustus founded Nemausus on site of former Volscian cap.; greatly favored by Agrippa, Antoninus Pius, and other emperors; taken by Vandals, Visigoths, Saracens, and Franks; long under Dukes of Toulouse; restored to France, 1259; Camisard stronghold; birthplace of Guizot, Daudet. Pop. (1921) 82,774.

NIMROD, in *Genesis* 10 a 'mighty hunter,' and builder of Assyria. The etymology is uncertain, and various unsuccessful attempts at identification have been made.

NINEVEH, celebrated ancient city, capital of Assyrian Empire, situated on Tigris, opposite modern town of Mosul. Practically nothing was known of the city till discoveries made by Layard, Rawlinson, Smith, Rassam, and others in mounds of Kuoyunjik, Nebi Yunus, Khorsabad, and Nineveh. Sennacherib made many additions to Nineveh, and under him city rose to great power and splendor; ruins of his palace and that of Assur-bani-pal contained in Kuoyunjik; traces of Esar-haddon's palace to be found in Nebi Yunus. Nineveh was captured by Medes and Babylonians, *c.* 606 B. C.

NING-PO (29° 42′ N., 121° 21′ E.); walled town, Cheh-kiang, China; one of Treaty ports, opened 1824; exports tea, silks, cotton; many monasteries and temples. Pop. (1919) 2,172,320.

NIOBE (classical myth.), *dau.* of Tantalus and Dione. Her pride in the number and beauty of her children gave offence to Leto, who caused Apollo and Artemis to slay the children.

NIOBIUM, OR COLUMBIUM, a metallic chemical element, symbol Nb or Cb, atomic weight 94. It is usually associated with tantalum, and occurs in the minerals tantalite, columbite, and fergusonite. The metal is obtained by reducing the chloride with hydrogen in a red-hot iron tube, or by reducing the oxide with carbon in the electric furnace. It is a steel-grey powder of sp. gr. 7·06, burns on heating in air, and is soluble in warm concentrated sulphuric acid.

NIORT (46° 19′ N., 0° 27′ W.), capital, Deux-Sèvres, France, on Sèvre-Niortaise; gloves. Pop. 23,500.

NIPIGON, NEPIGON (50° N., 87° 30′ W.), lake, Ontario, Canada; discharges by Nipigon River into Lake Superior.

NIPISSING (46° 16′ N., 80° W.), lake, Ontario, Canada; discharges into Lake Huron by French River.

NIPPON, see JAPAN.

NIPPUR, one of most ancient cities in Babylonia, was situated between Tigris and Euphrates; site identified as Nippur by Layard's excavations in 1851. In 1889, extensive excavations were carried on by Univ. of Pennsylvania, when thousands of tablets and fragments, besides remains of buildings, were unearthed; these inscriptions give excellent account of history of city, and in particular of temple. Nippur was evidently a sacred city, center of worship of Sumerian god En-lil; temple improved and completely rebuilt often. Arabs name site *Nuffar*.

NIRVANA, see BUDDHISM.

NISH, tn., Serbia, Jugo-Slavia (43° 27′ N., 20° 59′ E.), on the Nisava, trib. of Morava, 130 m. S. S. of Belgrade; in anc. times cap. of Upper Mœsia; seat of a bishop; railway workshops of Serbian railways; birthplace of Constantine the Great; pop. (tn.) 25,000; (dep.) 200,000; occupied by Bulgarians after three days' battle, Nov. 2-4, 1915· recovered by Serbians, Oct., 1918.

NISHAPUR (36° 8′ N., 58° 40′ E.), town, capital of Nishapur province, Persia; turquoise mines; birthplace of Omar Khayyám (*q.v.*). Pop. *c.* 16,000.

NISIBIS (37° N., 41° 10′ E.), ancient city and fortress, Mesopotamia; scene of repeated conflicts between Romans, Parthians, and Persians; modern Nisibin.

NITRATE, a salt of nitric acid deposits occurring in many parts of the world. The chief accumulations are in Chile and Peru. Great quantities of nitrate are obtained from Chile for the making of fertilizers.

NITRATE OF SILVER, the substance obtained by cooling the solution produced when silver is oxidized and dissolved by nitric acid diluted with water.

NITRATE OF SODA, a salt resembling in its chemical properties nitrate of potash or nitre. It is used chiefly as a fertilizer.

NITRE, OR SALTPETRE, potassium nitrate (KNO_3); Chile saltpetre is sodium nitrate ($NaNO_3$). It is found on the ground and impregnating the upper soil in India and Persia; the sodium nitrate is found in Chile and Peru. The soil is lixiviated and the pure salt obtained by crystallization. Potassium nitrate is used in the manufacture of gunpowder, sulphuric acid, and nitric acid, and in medicine as a diuretic and diaphoretic. The sodium nitrate is used for the manufacture of potassium nitrate and sulphuric and nitric acids and as a manure.

NITRIC ACID, AQUA FORTIS, HNO_3, colorless fuming liquid; B.P. 86° C.; prepared from Chile saltpetre ($NaNO_3 + H_2SO_4 = NaHSO_4 + HNO_3$); commercial acid (S.G. 1·42) contains about 70%; corrosive, dissolves metals, powerful oxidising agent, 'nitrates' benzene, etc.; stains skin yellow. Salts are nitrates, soluble in water; KNO_3 is nitre.

NITROCELLULOSE, the name given to a mixture of compounds resulting from the reaction between cellulose and nitric acid. The cellulose generally used is cotton, and when strong acids are employed the product is known as *gun-cotton*. Nitrocellulose was first made in 1832, by Braconnot who used starch instead of cotton. Its explosive character was discovered thirteen years later by Schonheim. When cellulose is nitrated in the presence of sulphuric acid and water, another form of nitrocellulose, known as *collodion cotton*, is produced. Collodion forms the basis of varnishes, celluloid, artificial leather and many other products.

NITRO-COMPOUNDS include a large group of organic compounds formed by the nitration of benzene and its derivatives. The nitration is carried out either by treatment with nitric acid alone, or by a mixture of nitric and sulphuric acids. These nitro-compounds are of great commercial importance, some of them being used as such, and others forming the basis of amino- and diazo-compounds used in the manufacture of dyes, explosives, drugs and other widely used products. Among the better known nitro compounds are the following:

NITROBENZENE, prepared by adding a mixture of nitric and sulphuric acids, drop by drop, to benzene. It is a pale yellow oil, having a strong smell of oil of bitter almonds. It is used in the manufacture of aniline. NITROTOLUENE, which forms the basis for toluidine which is used in the manufacture of dyes. PICRIC ACID, or trinitrophenol, used for dyeing and in the manufacture of explosives. NITRO-CELLULOSE, or gun cotton, which is described elsewhere. (See NITRO-CELLULOSE). Nitro derivatives of aromatic compounds are usually yellow in color, and frequently crystalline. When heated strongly they decompose, and sometimes explode. On reduction they form amino compounds.

NITROGEN (N = 14·01), gaseous element, molecule = N_2; occurs chiefly in the air (78% by volume, 75·5% by weight), and in combination as ammonia, nitrates, etc.—PREPARATION: (i.) by heating a concentrated solution of sodium nitrite and ammonium chloride, *e.g.* $NaNO_2 + NH_4Cl = NaCl + 2H_2O + N_2$; (ii) by oxidation of ammonia, *e.g.* $2NH_3 + 3NaOBr = 3NaBr + 3H_2O + N_2$; (iii.) by reduction of an oxide, *e.g.* $N_2O + Cu = CuO + N_2$.

PROPERTIES: colorless, tasteless, odorless, does not burn or support combustion; 1 part water dissolves 0·023 part N_2 at N.T.P.; 1 litre at N.T.P. weighs 1·25107 grain; critical temperature, – 149° C.; critical pressure, 27·5 atmospheres; B.P. (atm. press.), – 195·5° C.; M.P. – 210·5° C. Combines with heated lithium, calcium, barium, magnesium, forming nitrides, and with oxygen, by sparking, forming nitric oxide, NO. Hydrides: NH_3, N_2H_4, N_3H; hydroxylamine: NH_2OH; oxides: N_2O, NO, $N_4O_6(N_2O_3)$, $N_2O_4(NO_2)$, N_2O_5; oxy-acids: $H_2N_2O_2$, HNO_2, HNO_3.

Organic nitrogen compounds are numerous and complex. Nitrogen is a constituent of proteid matter.

NITRO-GLYCERINE ($C_3H_5(ONO_2)_3$), glyceryl trinitrate; prepared by slowly adding glycerine to a cold mixture of concentrated sulphuric (4 parts) and nitric (1 part) acids. Nitro-glycerine is an oil, sp. gr. 1·6; very explosive, especially when impure; mixed with kieselguhr, a siliceous earth, to make dynamite; is a constituent of cordite (smokeless powder).

NITROUS ETHER, OR ETHYL NITRATE ($C_2H_5NO_2$), a volatile and inflammable liquid, prepared by heating alcohol with copper and nitric and sulphuric acids; it is contained in the medicine known as 'sweet spirit of nitre.'

NITTI, FRANCESCO, Ital. statesman, economist, and author; minister of agriculture, industry, and commerce (1911-14); favored Italy's intervention on side of Allies in World War; was member of special Ital. mission to U. S., 1917; on return, his reputation as a financier and a former prof. of economics at Naples Univ. led to his appointment as minister of the treasury, 1917-19. On fall of Orlando administration, June, 1919, over Adriatic question he became prime minister, and held office until May, 1920.

NIU-CHWANG (40° 52′ N., 122° 5′ E.), town, Manchuria, China; one of Treaty ports, opened 1858; exports beans silk, skins, etc. Pop. 1921 82,100.

NIUE (19° 10′ S., 169° 50′ W.), coral island, S. Pacific.

NIVELLE, ROBERT GEORGES (1856), Fr. soldier, *b.* Tulle, of Eng. ancestry on his mother's side; he entered the artillery service; was colonel at outbreak of World War; distinguished himself in retreat from Charleroi and again at the battle of the Marne, Sept., 1914; promoted general and was Pétain's right-hand man in the defence of Verdun, succeeding him in the command of that vital sector and initiating the counter-offensive which brilliantly regained Forts Douaumont and Vaux, Oct. 24, 1916; appointed successor to Joffre as commander-in-chief of the Fr. Armies of the North and East, Dec. 12, 1916; undertook grand offensive on the Aisne front which failed to dislodge the Germans and entailed heavy losses to the French, April May, 1917; relieved of his position as generalissimo, May 15, 1917; received command of the Fr. forces in N. Africa, which he held till 1919.

NIVELLES (50° 36′ N., 4° 19′ E.), town, on Thines, Brabant, Belgium; carriages, paper. Pop. 12,500.

NIXON, SIR JOHN (1857-1923), Brit. soldier; held staff appointments in India and saw much active service; commanded Southern Army in India, 1912-15, and Northern Army, 1915; commanded Expeditionary Force in Mesopotamia, April 1915 to Jan., 1916.

NIXON, LEWIS (1861), an American shipbuilder, *b.* at Leesburg, Va., son of Joel Lewis and Mary Jane Turner Nixon. He graduated from the United States Naval Academy in 1882, at the head of his class and was sent to the Royal Naval College at Greenwich, England, by the Navy Dept. After serving in the construction corps of the navy and designing several battle ships, he resigned from the navy in 1890, to become superintending constructor of Cramp Shipyard, Phila., but again resigned five years later and started the Crescent Shipyard at Elizabeth, N. J., on his own account, in addition to which he organized the Standard Motor Construction Co., was proprietor of Lewis Nixon's Shipyard; started in 1900, and was president until 1904, of the International Smokeless Powder Co., and was later sole owner and manager of the Nixon Nitration Works.

NIZAMI, NIZA-MUDDIN ABU MUHAMMAD ILYAS BIN YUSUF (1141-1203), Pers. poet; of a very religious temperament, he spent the greater portion of his life in solitude and mediation. His first poem, *Makhzanul Asrār*, was speculative and didactic, but his poetic genius was best adapted to epic, as the publication of his great poem, *Khosrau and Shirin*, proved. This was followed

by the epics *Laila and Majnún*, and *Iskandarnāma* (an epic on the career of Alexander the Great). His last work, *Hūft Paikar*, or *Seven Beauties*, is a romance.

NIZHNE-TAGILSK (58° N., 60° 20′ E.), town, Perm. Russia; steel- and iron-works. Pop. 33,000.

NIZHNI-NOVGOROD, OR NIJNI-NOVGOROD.—(1) Government, European Russia (56° N., 44° E.); large area forested; watered by Volga and other rivers; produces timber, fruits, cereals; manufactures iron goods, leather; shipbuilding, sawmills, distilleries. Area, 19,789 sq. m.; pop. 2,081,200. (2) Tn., cap. of above; important commercial center; at junction of Oka and Volga rivers. City consists of Upper Town, with *Kremlin* begun XIV. cent.), situated on hills; Lower Town, along banks of Oka and Volga; and Fair Town, between two rivers. City possesses many eccles. buildings and several educational institutions; owes its importance to growth of manufactures and traffic along rivers, and fairs which attract merchants from all parts; chief industries—flour mills, distilleries, potteries, machinery works, and shipbuilding. Pop. 112,300.

NOAH, in *Genesis*, patriarch who survived Flood, and from whom, according to Bibical account, the human race descends. (Etymology uncertain.)

NOAILLES, Fr. noble family, drawing title from lordship of N., near Beauvais. With Antoine, noted admiral of XVI. cent., and his bro's François and Gilles, ambassadors, family attained prominence; great generals of XVII. and XVIII. cent's.

NOAKHALI (22° 48′ N., 91° 8′ E.), district, Bengal, India. Pop. 1,155,000, Chief town, Noakhali. Pop. 7,200.

NOBEL, ALFRED BERNHARD (1833-96), Swed. chemist; invented dynamite, blasting gelatine, and smokeless powders; established international prizes (value *c.* $40,000 each) for those distinguished in science, lit., and peace, awarded annually since 1901, by Swed. Academy of Science, Stockholm Faculty of Medicine, Swed. Academy of Literature, and Committee of Norweg. Storthing.

NOBEL PRIZES, FOUNDATION AND INSTITUTE.—The Swedish scientist and inventor of dynamite, Alfred B. Nobel bequeathed his fortune of about $9,000,000 to establish a fund, the interest of which was to be distributed in prizes to those persons who had contributed most to the improvement of mankind in the year preceding the award. The Board of Directors of the Nobel Foundation are Swedes, and must be residents of Stockholm. They have charge of the fund and pay the awards. Prize winners are chosen as follows. Physics and Chemistry, by the Royal Academy of Science, Stockholm. Medicine, by the Medical-Chirurgical Institute of Stockholm. Literature, by the Swedish Academy, and Peace, by the Norwegian Parliment. Awards 1910-1922. PHYSICS—J. D. Van Der Waals, Dane; W. Wien, German; Gustaf Dalm, Swede; H. K. Onnes, Dane; M. Von Laue German; W. H. Bragg, English; W. L. Bragg, English. 1916 prize not awarded C. G. Barkla, English; M. Planck, German; J. Stark, German; C. E. Gillaume, Swiss; Albert Einstein, German; Neils Bohr, Dane. CHEMISTRY—O. Wallach, German; Marie Curie, French; F. V. Grignard, French; Paul Sabatier, French; A. Werner, Swiss; T. W. Richards, American; R. Wellstatter, German. 1916-1917 not awarded—Prof. F. Haber, German. 1919 not awarded—Walter Nernst, German; Fred. Soddy, English; F. W. Aston, English. MEDICINE—A. Kessel, German; A. Guistand, Swede; A. Carrel, American; C. Richet, French; R. Brany, Austrian. 1915-16-17-18 no awards—Dr. Jules Bordet, Belgian; A. Krog, Dane. No awards 1920-1921-1922. LITERATURE—Paul Heyse, German; M. Mæterlinck, Belgian; G. Hauptmann, German; R. Tagore, Bengalese. In 1914 no awards. R. Rolland, French; V. Haldenstein, Swede; K. Gjellrup, Dane; H. Pontoppidan, Dane; Carl Spitteler, Swiss; Knut Hamsun, Norwegian, Anatole France, French; J. Benevente, Spanish. PEACE—International Peace Bureau, Switzerland. H. La Fontaine, Belgian. 1914-15, International Red Cross, Geneva, Woodrow Wilson, American. A. L. Bourgeois, French; K. H. Branting, Swede; Chris. Linge, Norwegian. The prize average $40,000.

NOBLE, gold coin of value 6s. 8d.; issued by Edward III.; rose to value 10s. in Edward IV.'s reign, and was superseded by the *Angel*.

NOBLE, EUGENE ALLEN, (1865-); an American educator, born at Brooklyn, N. Y., son of William Richard and Margaret J. Hayes Noble. He was educated at Wesleyan University, Conn., and at Northwestern University, Evanston, Ill. He was ordained a M. E. minister in 1892, and was a pastor until 1897, after which he was superintendent of Seney Hospital, Brooklyn, until 1902, and then head master of Centenary Collegiate Institute, at Hackettstown, N. J., until 1908. From then until 1911, he was president of Goucher College, Baltimore,

and of Dickinson College, Carlisle, Pa., from 1911-14, when he became executive secretary of the Juilliard Musical Foundation, New York.

NOBILITY. See KNIGHTHOOD.

NOCERA INFERIORE (40° 45′ N.; 14° 38′ E.), town, ancient *Nuceria Alfaterna*, on Sarno, Salerno, Italy; bp.'s see; textiles. Pop. 29,000.

NOCERA UMBRA (43° N.; 12° 46′ E.), town, ancient *Nuceria Camellaria*, Perugia, Italy; catherdal. Pop. 8,500.

NOCTURNE, in music a composition of a quiet, dreamy and emotional character, literally a 'night-piece,' corresponding to a certain extent with the earlier 'serenade.' The name and character originated with John Field (1782-1837), but it is a form of composition which Chopin made peculiarly his own.

NODDY, a name meaning foolish and slow, sometimes given to *Anous stolidus*, a genus of tropical terns. See TERNS.

NODE, in botany the joint of a stem, or part from which a leaf springs.

NODES.—The N. of a planet or any other celestial body are those two points where its orbit is cut by a fixed plane; in the case of the solar system, by the ecliptic. The straight line which joins these points is called the line of N. The point at which the orbit of a planet passes from under the ecliptic to above it is known as the *ascending node*, the other and opposite point necessarily being the *descending node*. The longitude of the ascending N. is one of the six 'elements' by which the movements of a celestial body are determined. Owing to the mutual attractions of the planets, the line of N. is continually shifting; alternately advancing and receding.

NODIER, CHARLES (1780-1844), Fr. author, writer of novels, tales, history, poetry, criticism, and philology, but more important as influence on the Romantics than for personal output; pioneer in study of Romantic subjects.

NOETUS (III. cent.), Christian priest of Smyrna; held Patripassian views of person of Christ.

NOGARET, GUILLAUME DE (*d.* 1313), Fr. statesman; advised, organized, and carried out capture of Pope Boniface VIII., 1303; pope liberated by Romans, but successor forced to absolve N.; active in securing suppression of Templars, 1307, and trail of bp. of Troyes, 1308-13.

NOGENT-LE-ROTROU (48° 19′ N., 0° 48′ E.), town, on Huisne, Eure-et-Loir, France; castle which belonged to Sully. Pop. 8,500.

NOGENT-SUR-MARNE (48° 45′ N.; 2° 25′ E.), town, on Marne, Seine, France Pop. 12,100.

NOGENT-SUR-SEINE (48° 29′ N.; 3° 30′ E.), town, on Seine, Aube, France. Pop. 4,000.

NOGI, KITEN MARASUKE, COUNT (1849-1912), a Japanese soldier, *b.* in Chosu, near Tokio. During the war against China, he lead a brigade and conducted himself so brilliantly that in 1896, he was appointed Governor-general of Formosa. At the outbreak of the war against Russia, in 1904, he had command of the operations against Port Arthur, reducing that fortress after a six month's siege. After that he lead the Japanese forces against Kuropatkin in Manchuria, defeating the Russians at Mukden in January, 1905, in what was at that time the biggest battle in history, over 700,000 men being engaged at one time. Gen. Nogi and his wife committed hara-kiri on the occasion of the Emperor Mutsuhito's funeral as a protest against the diminishing idealism of the younger generation.

NOGUCHI, HIDEYO (1876), a Japanese pathologist, *b.* in Inawashiro, Yama, Fukushima, Japan. He received his education under private tutors, graduated rom the Tokyo Medical College, in 1897, later studying at the University of Pennsylavnia and in Europe. After holding various positions in his native country, including that of quarantine officer for the harbor of Yokohama, he became assistant in pathology at the University of Pennsylvania, 1901-3; research assistant at the Carnegie Institute, 1903-4; and since 1914, has been a member of the Rockefeller Institute for Medical Research. Among his discoveries are the introduction of a skin test for syphilis, the cultivation of causative micro-organisms of infantile paralysis and rabies, and the development of a preventive vaccine and curative serum for yellow fever, the latter during 1918-21. He is the author of *Snake Venoms, 1909*; *Serum Diagnosis of Syphilis and Luetin Reaction, 1910*; and *Spirochetes*, 1921.

NOIRMOUTIER (47° N.; 2° 15′ W.); island, in Bay of Biscay, belonging to Vendée, France. Pop. 6,500.

NOLA (40° 54′ N., 14° 32′ E.); town, Caserta, Italy; seat of bishopric, has Gothic cathedral; captured by Romans during Samnite Wars, 313 B. C. Pop. 15,000.

NOMADS, wandering tribes without habitation. They are found now only in the interior of Africa and in South

America and other undeveloped portions of the earth.

NOLI (44° 13′ N., 8° 20′ E.), small town, Genoa, Italy, on Gulf of Genoa.

NOME, one of the principal ports and cities of Alaska, in the northwestern part, on the north shore of Norton Sound. It is the commercial center of a gold mining region, being founded as a mining camp in 1898. In the early days over $1,000,000 in gold was taken out of the sands of the nearby beaches during a period of three months, by the simple process of rocking. At the present time it presents all the aspects of a modern city, with electric lighting, sewerage system, water works, etc., but its harbor, ice bound during the greater part of the year, is open only from June to October. It has regular steamship connections with Seattle. The population in 1920, was about 5,000.

NOMENTUM, MODERN MENTANA (42° 3′ N., 12° 38′ E.), ancient town, Italy

NOMINALISM, theory that universal terms such as *man, town, plant* are mere names, and that the things they denote have no real existence; in scholastic philosophy of Middle Ages opposed to Realism.

NONCONFORMIST, 'one who does not conform'; generally used in England of those Protestants who do not conform to the Church of England.

NONCONFORMITY, LAW RELATING TO, differs from that of Church of England, *e.g.* the marriage law; Nonconformist ministers share with Anglicans certain exemptions, *e.g.* serving on juries.

NON-COMMISSIONED OFFICERS, see OFFICERS.

NON-JURORS, holders of public offices—mostly Church of England Clergymen—who declined to take the oath of allegiance to William and Mary in 1688, because they held that James II. was king by lawful and divine right.

NOOTKA SOUND, a harbor of the Pacific Ocean, on W. coast of Vancouver Is., British Columbia, Canada. It has deep water and is 10 m. wide.

NORA (39° N., 9° E.), ancient town, Sardinia.

NORBA, NORMA (41° 40′ N., 13° E.), ancient town, Latium, Italy; modern Norma.

NORBECK, PETER (1870), United States Senator; *b.* at Vermillion, South Dakota. Studied at University of South Dakota. President of a company of well drillers. For three terms a member of the South Dakota Senate. Lieutenant governor of South Dakota, and governor terms, 1917-1919 and 1919-1921. United States senator for term of 1921-1927.

NORCIA (42° 48′ N., 13° 4′ E.), town, Perugia, Italy; ancient *Nursia*; woolens; birthplace of St. Benedict. Pop. 10,000.

NORD (50° 30′ N., 3° 20′ E.), department, northern France; between Belgium and North Sea; area, 2,193 sq. miles; chief rivers, Scheldt, Scarpe, Oise, Sambre, Lys; capital, Lille; soil fertile; extensive coal mines; iron, steel, and other manufactures. Pop. (1921) 1,787,918.

NORDAU, MAX SIMON (1849-1922), Ger, author; *b.* Budapest, of Jewish parentage; disciple of Lombroso, and has applied his ideas in a series of works keenly critical of modern society; these include *The Conventional Lies of Civilization*, Eng. trans. 1884; *Paradoxes*, Eng. trans. 1896; *Degeneration*, Eng. trans. 1895; and *The Malady of the Century*, 1896; has also written novels and plays; has taken an active interest in the Zionist movement.

NORDENFELDT GUN. See MACHINE GUNS.

NORDENSKIÖLD, NILS ADOLF ERIK, BARON (1832-1901), Swed. geographer and Artic explorer; *b.* at Helsingfors, Finland. In the *Vega* he achieved the navigation of the North-East Passage.

NORDENSKIÖLD, NILS OTTO GUSTAF (1869), Swed. explorer; lecturer in geol. and mineralogy at Upsala Univ. 1894; and prof. at Göteborg Univ., 1905; explored the interior of Tierra del Fuego and visited Chile, 1895-7; accompanied Amdrup to E. Greenland, 1900; led a Swed. expedition to Louis Philippe Land in the Antarctic, 1901; and, his vessel being crushed in the ice, was rescued by an Argentine expedition, 1903; conducted an expedition to the Andes, exploring the northern forests of Bolivia, and tribes along the headwater tributaries of the Amazon, 1904-5; author of *Antartica, Die Polarwelt, La Terre de Feu.*

NORDERNEY (53° 43′ N., 7° 11′ E.), small island, North Sea, off coast of E. Friesland; belongs to Hanover, Prussia; sea-bathing resort. Pop. 4,500.

NORDFJORD (61° 58′ N., 6° E.), inlet, western coast, Norway.

NORDHAUSEN (51° 30′ N., 10° 48′ E.), town, Prussian Saxony; has R. C. cathedral; manufactures beer, spirits, tobacco, leather, etc. Pop. 33,000.

NORDICA, LILLIAN (1859-1914), an American opera singer, *b.* in Farmington, Me. She studied under O'Neil in the Boston Conservatory, then made her debut as a concert singer in 1876. Two years later she went to Europe with Gilmore's Band. For a period she studied in Milan, after which she made her first appearance in grand opera, at Brescia, in Traviata. As a result she signed a two years' engagement with the Imperial Opera in Petrograd. In 1882, she appeared in Paris, with great success. She first sang in New York in Opera in 1895. Her most pronounced success was in Wagnerian opera. After twelve years in New York she retired from opera and only appeared on the concert stage.

NORDIN, CARL GUSTAF (1749-1812), Swed. statesman, bp. and historian; principal adviser of Gustavus III.; collection of MSS. nucleus of *Scriptores rerum Suecicarum medii ævi.*

NÖRDLINGEN (48° 51′ N., 10° 29′ E.), town, Germany; here Imperialists defeated Swedes, 1634, and French defeated Imperialists, 1645. Pop. 9,000.

NORE, THE (51° 28′ N., 0° 48′ E.), sandbank, in estuary of Thames, England; marked by lightship; a Brit. fleet mutinied here, May-June, 1797.

NORFOLK (52° 12′ N., 1° E.), co., E. England; bounded on N. and E. by North Sea, S. by Suffolk, W. by Cambridge and Lincoln; area, 2044 sq. miles. Coast is mostly low and flat, with few indentations. Inland are undulating plains, valleys, and woods. In W. is Fen district. *Broads*, lying in E. part of county, are series of lakes joining various rivers. Principal streams are Great and Little Ouse, Yare, Bure, Wensum, Waveney. Manufactures include boots, shoes, silk, wool, flour, mustard, and agricultural implements. Chief towns are Norwich (county town), Yarmouth, Lynn, Cromer, Wells, and Thetford. Notable castles at Castle Rising, Castle Acre, and Norwich; some beautiful houses, Sandringham being among the more modern mansions. Pop. 504,000.

NORFOLK, a city of Nebraska, in Madison co. It is on the Chicago and Northwestern, and the Union Pacific Railroad, and on the Elkhorn River. It is the trade center for an extensive farming and stock raising region and is also important industrially. It has important manufactures of flour, cereal, concrete, packing house products, threshing machines, etc. It is the division headquarters of the Northwestern railroad. It is the site of the State Hospital for the Insane and has a Federal court house, a public library and a park. Pop. 1920, 8,684.

NORFOLK, a city of Virginia, in Norfolk co. It is on the Seaboard Air Line, the Atlantic Coast Line, Chesapeake and Ohio, the Southern, and other railroads, and on the Elizabeth river. Norfolk is one of the most important commercial cities of the South. It has an excellent harbor and during the World War great navy yards were erected here in which were constructed many large ships. It was also an army base during the war and a shipping point for troops and supplies to Europe. Norfolk has a large export trade in canned goods, fruits, vegetables, oysters and peanuts. For the latter product it is the largest market in the world. The city has a U. S. Naval Hospital, U. S. custom house, and is the seat of Norfolk Academy and other educational institutions. Its commerce amounts to over $3,000,000 annually and its industries include the manufacture of lumber, knit goods, fertilizers, iron products, etc. Pop. 1920, 115,777.

NORFOLK ISLAND (29° S., 167° 56′ E.), Brit. island, S. Pacific; dependency of New South Wales; formerly a penal settlement; colonized by Pitcairn islanders, 1856.

NORICUM, an ancient province of Rome, lying to S. of Danube; now included in Austria, Carinthia, Styria, and Salzburg.

NORMAL SCHOOLS, training colleges for teachers. See EDUCATION.

NORMAN ARCHITECTURE. See ARCHITECTURE.

NORMAN CONQUEST, see ENGLAND (History).

NORMAN, SIR HENRY WYLIE (1826-1904), Anglo-Indian field-marshal; performed brave rescue in second Sikh War, 1844; distinguished in Mutiny; gov. of Jamaica, 1883; Queensland, 1888; field-marshal, 1902.

NORMANDY (49° N., 0°), old province of France, between Brittany and Fr. Flanders; N. and W. coasts washed by Eng. Channel; now comprises the five departments, Seine-Inférieure, Eure, Calvados, Manche, and Orne; total area, 10,500 sq. miles. Normandy has fine pasture-land and orchards, picturesque and varied coast scenery; chief river, Seine; principal towns, Rouen (capital), Evreux, Caen, Alençon, Le Havre, Dieppe, Honfleur, Harfleur, Cherbuorg on coast; numerous bathing resorts. Country was invaded and conquered by Northmen, IX. cent., who definitely

settled, 911, when Fr. king, Charles the Simple, granted the land thereafter called N., Rollo the viking chief doing homage as first Duke of N.; united with England after Norman Conquest, 1066; passed to France, 1204; retaken by England, 1346, 1417; English finally defeated, 1450. Normandy has given France many of her greatest men.

NORMANS, Scandinavians who emigrated in X. cent. from Norway, etc., to Gaul, and became absorbed in Romano-Gallic population of N. E. France, forming duchy of *Normandy* in Fr. kingdom. This branch of 'Northmen' also colonized Britain, Sicily, and S. Italyin XI. cent. Their first recorded appearance on Fr. coast was in V. cent. Invasions increased in number, but remained mere piratical attacks. Defeated by the Frankish ruler, Théodebert, 530, the Northmen for a time came more rarely. The pirate Adroald marked the coming era of settlement by establishing himself at Saint-Omer. Charlemagne kept them in awe, but after his death they appeared in the Seine and made a settlement in Ile de Noirmoutier. Yearly invasions and pillagings followed, Paris being terrorized, 845 and 885, and numerous towns burned and battles fought. Although bribed to depart, they soon returned in larger numbers. Charles the Simple granted part of Neustria, the subsequent Normandy, to the viking, Rolf the Ganger, 911, on condition that he became Christian and prevented any further invasions by the Seine. Rouen became capital of the new fief, now a settled colony.

The Normans adopted Fr. tongue and customs, became the foremost people of France and pioneers in all new movements, religious or artistic—witness their famous arch. and *chansons de geste*, and Bec Abbey, the great centre of civilization. They showed themselves the most energetic people of Europe, and made many conquests outside France. Ralph de Toni assisted the Italians against the Byzantine emperor, 1017, and other Norman nobles began to settle in Italy. Apulia was conquered, 1041-42. Celebrated Robert Guiscard (*q.v.*) became Duke of Apulia and Calabria, 1059. His bro. Roger conquered Sicily, 1060-1101. Roger's son united Sicily and Apulia in Norman kingdom of Naples or Sicily. England was conquered by William, Duke of Normandy, 1066.

NORMANTON.—(1) (53° 42′ N., 1° 25′ W.), town, on Calder, Yorkshire, England; coal mines. Pop. 15,000. (2) (17° 38′ S., 141° 25′ E.), town, river port, on Norman, Queensland, Australia.

NORRIS, CHARLES (1881), an American writer, *b.* in Chicago. He was the *bro.* of Frank Norris. He graduated from the University of California in 1903 and was for several years connected in an editorial capacity with several magazines. He published *Salt, 1919*, *Brass, 1921*, and *Bread, 1923*. *Brass* was one of the most successful novels of the year.

NORRIS, FRANK (1870-1902), an American author, *b.* in San Francisco. After a three years' art course in Paris he studied at Harvard University, without graduating; was a correspondent for a San Francisco paper in South Africa during 1895-6, after which he returned to San Francisco and went into newspaper work. His comparatively early death broke off what had promised to be a very remarkable literary career. He wrote a number of realistic novels, the outstanding ones of which were *The Octopus, 1901*; and *The Pit, 1902*; two of a proposed trilogy, the third of which was to have been called *The Wolf*, dealing with the growth, distribution and consumption of wheat. *The Octopus* deals with the struggle of the California growers with the railroad combination. *The Pit*, much inferior in literary quality, has as its theme the gambling of the wheat speculators in Chicago. *The Wolf* was to have dealt with the hungry peasantry of Europe.

NORRIS, GEORGE WILLIAM (1861), a U. S. senator, *b.* on a farm at Sandusky county, Ohio. He was educated at Baldwin University, Ohio, and Northern Indiana Normal School, the means for which he earned by teaching school. He studied law while teaching and later completed his studies in a law school. He was admitted to the bar in 1883, but taught for another year in order to get the means to purchase a law library, after which he moved to Nebraska. He was prosecuting attorney for three terms and judge of the 14th Nebraska District from 1895-1902, was a member of the 58th to 62nd Congresses 1903-13, 5th Neb. Dist. then United States senator for two terms, 1913-25.

NORRIS, JAMES FLACK (1871); Chemist; *b.* at Baltimore. Graduated from Johns Hopkins University in 1892. At Massachusetts Institute of Technology, assistant 1895-1896, instructor 1896-1900, and assistant professor of organic chemistry. At Simmons College, Boston, 1904-1915, professor of chemistry. From 1915-1916, Vanderbilt University. Since 1916, professor of organic chemistry at Massachusetts Institute of Technology. From 1917-1918, in charge of offense chemical research and war gas investigations at the United

States Bureau of Mines. An associate member of the Naval Consulting Board in 1916. In England, 1918 as lieutenant colonel in the United States Army in charge of United States Chemical Warfare. In Germany, 1919, in charge of investigation of manufacture of war gases. From 1912- 1914 at Harvard, as lecturer on organic chemistry, Clark University from 1913-1914. Author of: *The Principles of Organic Chemistry, Experimental Organic Chemistry, Text-Book of Inorganic Chemistry for Colleges.* Wrote numerous papers on chemical subjects.

NORRIS, KATHLEEN (1880), an American author, *b.* at San Francisco, *dau.* of James Alden and Josephine Moroney Thompson. She was educated mainly by her parents and private teachers, however, she took a special course of a few months at the University of California. She began writing in 1910 and afterwards contributed to many the leading magazines including The American, Everybody's, McClure's, The Ladies' Home Journal, Woman's Home Companion, The Saturday Evening Post, Good Housekeeping and the Pictorial Review, and was the author of: *Mother, 1911*; *The Rich Mrs. Burgoyne, 1912*; *Poor Dear Margaret Kirby, 1913*; *Saturday's Child, 1914*; *The Story of Julia Page, 1915*; *The Heart of Rachael, 1916*; *Martie, The Unconquered*, also *Undertow, 1917*; *Josslyn's Wife, 1918*; *Sisters, 1919*; and *Beloved Woman, 1921*. She married Charles Gilman Norris of San Francisco in 1909.

NORRIS, WILLIAM EDWARD (1847-), English novelist; barrister, Inner Temple, but has never practiced. His first novel, *Heaps of Money, 1877*, was followed by many more, including *Matrimony, Clarissa Furiosa, The Flower of the Flock, Nature's Comedian, Proud Peter*, and *The Fond Fugitives.*

NORRISTOWN, a borough of Pennsylvania, in Montgomery co., of which it is the county seat. It is on the Philadelphia and Reading, and the Pennsylvania railroads, and on the Schuylkill river and Schuylkill canal. It is an important industrial city and has steel casting works, shirt factories, machine shops, glass works, carpet mills, iron foundries, cigar factories, woolen mills, etc. It has a Friends' Home for the Aged, a charitable hospital for the Insane, and a Masonic Temple. Pop. 1920, 32,319.

NORRKÖPING (58° 35′ N.; 16° 10′ E.), city, on Motala, Östergötland, Sweden; cotton goods; burned by Russians, 1819. Pop. 1921, 58,101.

NORSE. See VIKINGS.

NORTH, one of the cardinal points of the compass, being that point of the horizon which is exactly in the direction of the North Pole.

NORTH, CHARLES EDWARD (1869), Sanitarian, *b.* at Scarborough, New York. Graduated from Weslayan University, Connecticut in 1893. Appointed a director of research on the value of bacterial vaccines and Opsonic Index, by the Department of Health, New York City in 1908. From 1908-1910, consulting bacteriologist of the Jersey City Water Department. In 1910, established clean milk for infant milk stations of New York Milk Committee. In New York-New Jersey litigation over Passaic Valley Sewer, in 1913, he was the New York consulting expert. In 1917, appointed chairman of Mayor Mitchel Committee on Milk. Expert for Montclair, New Jersey, in 1919, over water supply litigation. In 1921, at Kansas City, Missouri, survey of milk supply. Author of: *The Farmer's Clean Milk Book, 1918.*

NORTH, FRANK MASON (1850), Clergyman, *b.* in New York. In 1872, graduated from Weslayan University. In 1873, ordained a Methodist Episcopal minister. Pastor, 1873-1874, at Flordia, New York, and various other churches until 1892. From 1892-1912, corresponding secretary of the New York City Church Extension and Missionary Society and in 1896-1912, of the National City Evangelical Union of the Methodist Episcopal Church. The corresponding secretary of the Board of Foreign Missions of the Methodist Episcopal Church since 1912, chairman of the executive committee until 1916, and president since then. In 1919, Chevalier of the Legion of Honor, and Officer of the Royal Order of George I., Greece, 1920.

NORTH, FREDERICK, SECOND EARL OF GUILFORD, BETTER KNOWN AS LORD NORTH (1732-92), a statesman, entered parliament in 1754, and was a Junior Lord of the Treasury from 1759 until 1766, in which year he became Joint-Paymaster of the Forces. In 1767 he became Chancellor of the Exchequer and Leader of the House of Commons in the Grafton administration, and three years later he became Prime Minister. In that high office he acted as the mouthpiece of the king, who ruled the House of Commons by bribes and threats, and, by appeals to his loyalty, induced N. to carry out his will. N. war opposed to the American War, but allowed the king to influence him against his better judgment. He resigned in March 1782, but with Fox formed a government which endured from April

ALEUTIAN ISLANDS
Same scale as main map
172° Longitude East 180° Longitude West 172° from Greenwich 164°
BERING SEA
ALEUTIAN
ARCTIC OCEAN
GREENLAND
(To Denmark)
DAVIS STRAIT
BAFFIN BAY
HUDSON BAY
Hudson Strait
SEA
Gulf of Alaska
Yukon
Dawson
Whitehorse
Edmonton
Saskatoon
Regina
Winnipeg
Calgary
Vancouver
Victoria
Montreal
Ottawa
Toronto
Quebec
Halifax
Yarmouth
Sydney
Fargo
Duluth
Sault Ste. Marie
Sudbury
Cobalt
Kenora
Port Arthur
Fort William
Moose Jaw
Prince Albert
Red Deer
Lethbridge
Grand Forks
Great Slave Lake
Resolution
Churchill
Nelson
York Factory
Fort Nelson
Fort Simpson
Fort Wrigley
Fort Norman
Fort McMurray
Fort Vermilion
Peace River
Athabasca Landing
Lake Athabasca
Lake Winnipeg
Lake of the Woods
Albany R.
James Bay
Hopedale
Port Burwell
Cape Chidley
Cape Dyer
Cape Dorset
Cape Race
Cape Breton I.
Prince Edward I.
Vancouver Island
Queen Charlotte Islands
Prince of Wales I.
Banks I.
Victoria I.
Melville I.
Baffin I.
Southampton I.
Coats I.
Mansel I.
Akpatok I.
Resolution I.
Labrador
Newfoundland
St. John's
Gaspé
Anticosti I.
Belle Isle
Strait of Belle Isle
Strait of Dover
Greenland Sea
Arctic Circle
Boothia Peninsula
Melville Peninsula
Foxe Basin
Foxe Channel
Gulf of St. Lawrence
Gulf of Georgia
Juan de Fuca Strait
Bering Strait
Behring Sea
Kotzebue Sound
Norton Sound
Yukon R.
Mackenzie R.
Liard R.
Peace R.
Saskatchewan R.
Nelson R.
Churchill R.
Red R.
Missouri R.
Columbia R.
Fraser R.
Ottawa R.
St. Lawrence R.
Great Bear L.
Great Slave L.
Athabasca L.
Lake Winnipeg
Lake of the Woods
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Lake Nipigon
Lake Abitibi
Lake Timiskaming
Lake Nipissing
Lake Simcoe
Lake Temiscamingue
Lake St. John
Lake Kootenay
Lake Okanagan
Lake Chilliwack
Lake Winnipegosis
Lake Manitoba
Lake Dauphin
Lake Athabasca
Lake Claire
Lake Bonneville
Lake Lahontan
Lake Malheur
Lake Klamath
Lake Tahoe
Lake Pyramid
Lake Winnemucca
Lake Mono
Lake Utah
Lake Great Salt
Lake Timpanogos
Lake Uinta
Lake Gilbert
Lake Hind
Lake Agassiz
Lake Souris
Lake Dakota
Lake Minnesota
Lake Regina
Lake Saskatchewan
Lake Algonquin
Lake Iroquois
Lake Chicago
Lake Duluth
Lake Warren
Lake Arkansas
Lake Missoula
Lake Flathead
Lake Columbia
Lake Kootenay
Lake Okanagan
Lake Chilliwack
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Lake Dakota
Lake Minnesota
Lake Regina
Lake Saskatchewan
Lake Algonquin
Lake Iroquois
Lake Chicago
Lake Duluth
Lake Warren
Lake Arkansas
Lake Missoula
Lake Flathead
Lake Columbia

NORTH AMERICA
SCALE OF MILES
0 100 200 300 400 500 600 700 800
The World Syndicate Company, Inc., N.Y.
PACIFIC OCEAN
ATLANTIC OCEAN
GULF OF MEXICO
CARIBBEAN SEA
Mexico
CENTRAL AMERICA
SOUTH AMERICA
BAHAMA ISLANDS
JAMAICA
HONDURAS
NICARAGUA
CALIF.
ARIZ.
N.MEX.
TEX.
NEBR.
KANS.
OKLA.
ILL.
IOWA
MINN.
WYO.
COLO.
UTAH
NEV.
San Francisco
Los Angeles
New York
Philadelphia
Chicago
Pittsburgh
Detroit
Cleveland
Cincinnati
St. Louis
Denver
Omaha
Kansas City
Pueblo
Albuquerque
Oklahoma City
Little Rock
Memphis
Nashville
Atlanta
Charleston
Jacksonville
St. Augustine
Savannah
Mobile
New Orleans
Dallas
Houston
Galveston
San Antonio
El Paso
Juarez
Chihuahua
Monterrey
Tampico
Vera Cruz
Merida
Campeche
Havana
Kingston
Port au Prince
Santiago
Bermuda Is.
Tropic of Cancer
Equator
Panama
Guadalajara
Mazatlan
Acapulco
Puebla
Guatemala
Tegucigalpa
San Salvador
Managua
San Jose
Belize
Trinidad
Barbados
Curacao
Caracas
Maracaibo
Bogota
Quito
Lima
Callao
Arequipa
Iquique
Valparaiso
Santiago
Buenos Aires
Montevideo
Rio de Janeiro
Pernambuco
Bahia
Para
Manaos
Iquitos
Cayenne
Georgetown
Paramaribo
Puerto Rico
Guadeloupe
Dominica
Martinique
St. Lucia
St. Vincent
Grenada
Trinidad
Barbados
Curacao
Aruba
Bonaire
Leeward Islands
Windward Islands
Virgin Islands
Netherlands Antilles
Galapagos Is.
Juan Fernandez Is.
Falkland Is.
Tierra del Fuego
Cape Horn
Strait of Magellan
Panama Canal
Gulf of Mexico
Gulf of California
Gulf of Campeche
Gulf of Honduras
Gulf of Fonseca
Gulf of Nicoya
Gulf of Darien
Caribbean Sea
Pacific Ocean
Atlantic Ocean
Bermuda Is.
Bahama Islands
Jamaica
Cuba
Haiti
Dominican Republic
Puerto Rico
Virgin Islands
Leeward Islands
Windward Islands
Netherlands Antilles
Trinidad
Barbados
Curacao
Aruba
Bonaire

to Dec. 1783, after which he did not again hold office. He succeeded to the earldom in 1790. An able financier, he was a weak man, and responsible for much of the troubles that arose in the earlier years of the reign of George III.

NORTH, MARIANNE (1830-90), Eng. botanist; travelled all around the world painting flora.

NORTH, SIMON NEWTON DEXTER, (1849), an American statistician, *b.* at Clinton, N. Y., *s.* of Dr. Edward and Mary F. Dexter North. He graduated from Hamilton College in 1869. After being managing editor of the Utica Morning Herald and later editor and joint proprietor of the Albany Express, he was secretary of the National Association of Wool Manufacturers, Boston, and editor of the Quarterly Bulletin from 1888-1903, director of the United States Census from 1903-9 and assistant secretary and statistician of the Carnegie Endowment for International Peace from 1910-21. Author: *An American Textile Glossary, 1895*; *A History of the American Wool Manufacture, 1903*; and others.

NORTH ADAMS, a city of Massachusetts, in Berkshire co. It is on the Boston and Maine, and the Boston and Albany railroads, and on the Hoosac river. It includes several villages. Its industries include the manufacture of tanned leather, lumber, iron castings, boots and shoes, etc. Nearby is the eastern terminal of the Hoosac tunnel. The city has a library, a high school and a hospital. Pop. 1920, 22,282.

NORTH AMERICA, see AMERICA, UNITED STATES, CANADA, NEWFOUNDLAND, ALASKA, etc.

NORTHAMPTON (52° 15′ N., 0° 54′ W.), municipal, parliamentary, and county borough in Northamptonshire, England, on river Nene; of great historic interest; contains All Saints' and St. Sepulchre's Churches and an Eleanor cross; seat of leather manufactures; other industries—tanning, brewing, and iron-founding. Pop. 1921, 92,300.

NORTHAMPTON, a city of Massachusetts, in Hampshire co., of which it is the county seat. It is on the New York, New Haven and Hartford, and the Boston and Maine railroads, and on the Connecticut river. It includes several villages. Its industries include the manufactures of caskets, shovels, hose, furniture, paper, brushes, wire, sewing machines, oil stoves, cutlery, etc. It is notable for being the seat of Smith College. Here are also the Burnham and Capen schools, Clark Institute for Deaf Mutes, the State Lunatic Asylum, Old Ladies' Home, Dickinson Hospital, People's Institute and Hillyer Art Gallery. Pop. 1920, 21,951.

NORTHAMPTON, a borough of Pennsylvania, in Northampton co. It is on the Central of New Jersey and the Lehigh Valley railroads. Pop. 1920, 9,349.

NORTHAMPTONSHIRE (52° 15′ N., 1° W.), midland co., England; bounded by Lincoln, Rutland, Leicester, Warwick, Oxford, Bucks, Bedford, Huntington, and Cambridge; area, 909 sq. miles. Surface is undulating; highest ground near Daventry; some parts richly wooded and well cultivated, finest scenery being in W. and S. W. N. E. forms part of Fen district. Chief rivers are Nene, Welland, Avon, Cherwell, Leam, and Ouse. Chief towns are Northampton (county town), Peterborough, Kettering, and Wellingborough. At Peterborough is fine cathedral; interesting churches to be found at Earls Barton, Brigstock, Brixworth, Irthlingborough, and elsewhere; remains of several castles, including those of Fotheringay and Barnwell. Pop. 1920, 300,000.

NORTH ANDOVER, a town of Massachusetts, in Essex co. It is on the Boston and Maine railroad, and on the Merrimac river. It is chiefly a residential community but has also important industries which include the manufacture of woolen goods and wool macking machinery. Pop. 1920, 6,265.

NORTH ATTLEBORO, a city of Massachusetts, in Bristol co. It is on the New York, New Haven and Hartford railroad. It includes several villages. It has industries of great importance and is especially notable for the manufacture of cheap jewelry. Its industries include the making of cotton yarn, braid, silverware, etc. It has a memorial library, Elks' Home and other public buildings. Pop. 1920, 9,238.

NORTH BORNEO, British. See BORNEO.

NORTH BRABANT, see BRABANT.

NORTH BRADDOCK, a borough of Pennsylvania, in Allegheny co. It is on the Pennsylvania railroad. It is an important manufacturing community, its chief industry being the making of steel rails. It is also an attractive residential city. Pop. 1920, 14,928.

NORTHBRIDGE, a city of Massachusetts, in Worcester co. It is on the New York, New Haven and Hartford railroad, and the Blackstone and Mumford rivers. The town includes several villages. Its industries include the man-

ufacture of cotton mill machinery, cotton, silk, paper, etc. There is a public library and a hospital. Pop. 1920, 10,174.

NORTH CAPE (71° 10′ N.; 25° 45′ E.), promontory, Norway, on island of Magerö; most northerly point of Europe.

NORTH CAROLINA, a S. E. Atlantic state of U. S. (35° 40′ N., 79° W.), bounded N. by Virginia, W. by Tennessee, S. and S. W. by S. Carolina and Georgia, E. and S. E. by Atlantic; length (E. to W.), *c.* 500 m.; breadth, *c.* 200 m. Coast is fringed with sand reefs, with three outstanding capes—Hatteras, Fear, and Lookout; water shallow in Pamlico, Currituck, Albemarle Sounds, etc., which makes navigation very dangerous. Surface is mountainous in W. and S. E.; Great Smoky Mts., Black Mts., Bald Mts., Blue Ridge, etc.; highest peak Black Dome or Mt. Mitchell, 6,711 ft. Coastal plain region is level and swampy; central part undulating.

Chief rivers are: Broad, Cape Fear, Roanoke, Neuse, Chowan, Tar, Yadkin, Pamlico, Hiawassee, Catawba (many navigable); shallow lakes in coastal districts; several small swamps (Great and Little Dismal, Angola, Alligator, etc.). Climate of mountain region is exceptionally fine, central part healthy; fever near swamps in coastal region; mean ann. temp. in mountain region, 56° F., central region, 60° F., coast region, 61° F.; mean ann. rainfall, *c.* 53 in. See Map of U. S.

Fauna includes deer, racoons, opossums, wolf; numerous reptiles (rattlesnake, moccasin, cotton-mouth, etc.); flora varied; many subtropical species, and also those of milder regions; extensive forests, especially pine, in E.; trees include elm, cypress, cedar, oak, birch, beech, hemlock; large fields of rhododendrons.

Agriculture is main occupation; principal products, cereals, cotton, tobacco, cotton-seed oil, potatoes, timber; industries of cotton goods, furniture, flour, lumber, etc.; minerals unimportant; valuable fisheries (shad, oyster, etc.). Area, 52,426 sq. m. (water, 3,686 sq. m.); pop. 1920, 2,559,123 (including *c.* 700,000 negroes).

N. Carolina is administered by governor and General Assembly consisting of Senate (50 members), and House of Representatives (120 members), elected for two years; sends ten representatives and two senators to Congress. N. Carolina is divided into 98 counties. Principal towns: Raleigh (cap.), Wilmington (principal port), Charlotte, Asheville, Greensboro, Winston, Newbern. Methodists predominate; then Baptists. Elementary education is compulsory: Univ. of N. Carolina, State Agricultural and Mechanical Colleges, Trinity College at Durham; Shaw Univ. at Raleigh, Biddle Univ. (Charlotte), Agricultural and Mechanical Colleges (Greensboro), etc., for colored students.

NORTH CAROLINA COLLEGE OF AGRICULTURE AND MECHANICAL ARTS, a technical educational institution founded in West Raleigh in 1889, by a group of citizens desiring to cultivate the industrial development of the state. It has the regular college courses, without the classical languages, but with technical science added, especially civil, electrical and chemical engineering. Both the Federal Government and the State assist the agricultural department with appropriations. The faculty numbers about 60 and the student body averages 750.

NORTH CAROLINA, UNIVERSITY OF a co-educational institution, founded in 1795, at Chapel Hill, N. C. It includes departments of law, medicine, pharmacy, and a graduate school, beside the college itself. During the 1921-2 session there were 1,681 students enrolled, while 1,090 attended the summer school. The teaching staff numbered 115. At this time the university had just received a gift of $45,000 from the General Education fund to supplement the salaries of teachers. The library had over 100,000 volumes.

NORTH, CHRISTOPHER, see WILSON, JOHN.

NORTHCLIFFE (ALFRED CHARLES WILLIAM HARMSWORTH), 1ST VISCOUNT (1865-1922), newspaper proprietor; foundod *Answers*, *1888*; *Daily Mail*, *1896*; chief proprietor of the *Times* and numerous daily and weekly newspapers and magazines; did much for the improvement of aviation by the offer of valuable prizes; cr. baron, 1905; appointed director of the Civil Aerial Transport Committee and chairman of the British War Mission to the U. S., 1917; became director of propaganda in enemy countries, 1918; cr. viscount, 1917.

NORTHCOTE, SIR STAFFORD, see IDDESLEIGH, EARL OF.

NORTH DAKOTA, N. central state of U. S. (47° 30′ N., 100° W.), bounded on N. by Canadian provinces of Saskatchewan and Manitoba, E. by Minnesota, S. by S. Dakota, W. by Montana; surface consists mainly of plateaus, undulating plains, and grassy prairies; there are no trees unless along river banks, round shores of lakes, and in sheltered spots; state in some parts well watered, chief rivers being Red R. of the N., which

forms E. boundary, and its affluents, Mouse (or Souris), Cheyenne, Goose, Park, and Pembina; Missouri, with tribs. Little Missouri, Big Knife, and Cannon Ball; in N. E. is sheet of salt water, Devil's Lake, or Minnewaukon. High plateau called Coteau du Missouri extends from N. W. to S. E., and divides state in two; state contains no great elevations, highest ground being in S. of Bowman co. See Map of U. S.

First successful settlements were made at Pembina; state terr. included in country ceded to U. S. from France by Louisiana Purchase, 1803; terrs. of N. and S. Dakotas organized in 1861, and proclaimed separate states in 1889.

Governor is elected every two years; state represented in Congress by 2 senators and 3 representatives; senate of 49, house of representatives of 113 members.

Especially in valley of Red R. soil is rich, fertile, and highly cultivated; state famous wheat-growing country; agriculture chief industry; there are extensive farms; principal crops besides wheat are barley, rye, flax, hay, potatoes, and maize; in W. ranching is successfully carried on; 40,000 ac. to be irrigated; chief minerals produced are lignite, sandstone, and clays. Manufactures include flour, paper, and dairy produce, but are of no great importance. Principal towns are Bismark (cap.), Fargo, Grand Forks, and Jamestown. Climate is healthy, summer short and winter severe but dry. Area, 70,837 sq. m.; pop. 1920, 646,872.

NORTH DAKOTA AGRICULTURAL COLLEGE, an educational institution opened in Fargo, in 1891, emphasizing agriculture, but also giving courses in general sciences and mechanical engineering. The faculty numbers 85 and the students average 900.

NORTH DAKOTA, UNIVERSITY OF a co-educational institution founded by the state at University Station, Grand Forks, N. D., in 1883. The productive funds consist of Federal land endowments invested, altogether amounting to $2,203,053. It has a library containing 72,000 volumes. In the fall of 1921, there was a student body of 1,247, while the faculty numbered 121, an increase of nine members over the year previous.

NORTH-EAST PASSAGE, the route, finally found by A. E. Nordenskjöld in 1878-79, from Europe and the Atlantic through the Artic Ocean round the N. coast of Asia to the Pacific Ocean.

NORTHERN MYTHS. See MYTHOLOGY.

NORTHFIELD CONFERENCE AND SUMMER SCHOOLS, THE founded at East Northfield by Dwight L. Moody (*q.v.*) the evangelist, in 1882. The Students Conference first held in 1886, has been continued annually ever since. Its purpose is to inspire students in Christian work and encourage Christian endeavor. Since 1888, a General Conference of Christian Workers has been held here. Other annual assemblies are Young Women's Conference, Home Mission School, and Foreign Missionary School. Mount Hermon School founded by Mr. Moody offers bible study courses at the summer gatherings.

NORTHFLEET (51° 26′ N.; 0° 21′ E.), urban district, Kent, England; chemical works. Pop. 14,000.

NORTH HOLLAND (52° 35′ N.; 4° 50′ E.), province of Netherlands between North Sea and Zuider Zee; area, 1,070 sq. miles; it includes the islands Texel, Vlieland, Terscheling, Marken, Wieringen, and Urk; chief towns, Amsterdam and Haarlem; cattle-rearing, cheese-making, chief industries. Pop., 1921; 1,290,723.

NORTH LITTLE ROCK, a city of Arkansas, in Pulaski co. Pop., 1920, 14,048.

NORTH PLAINFIELD, a borough of New Jersey in Somerset co. It is on the Central Railroad of New Jersey. Its industries include fruit canneries, wood working factories, a telescope factory, etc. There are important stone quarries in the neighborhood. Here are Mount St. Mary's College and Herbert's Hall for Exceptional Children. Pop., 1920, 6,916.

NORTH PLATTE, a town of Nebraska, in Lincoln co. It is on the Union Pacific Railroad, and at the junction of the North and South Platte rivers. It is an important industrial city and has grain elevators, machine shops, railroad shops, etc. It is the chief trade center for an extensive agricultural and cattle-raising district. It has a U. S. land office, a Federal building, State Experiment Station, and a public library. Pop., 1920, 10,466.

NORTH POLE, see POLAR REGIONS.

NORTH POLE EXPEDITIONS, see POLAR REGIONS.

NORTH SEA, shallow sea; part of Atlantic between Great Britain, Belgium, Holland, Germany, Denmark, and Norway (56° 30′ N., 3° E.); greatest depth off Norwegian coast (440 fathoms); bed crossed by large banks (Dogger, Jutland, etc.); it communicates with Baltic through Skager-Rack, Kattegat, and Kiel Canal; with Atlantic through Strait of Dover, Eng. Channel, etc.; and

receives Rhine, Elbe, Thames, Forth, Tay, Tweed, etc.; few islands except near coasts of surrounding countries; extensive fisheries; length, 600 m.; breadth, 400 m.; area, *c.* 200,000 sq. m.

NORTH SEA CANAL. See KIEL CANAL.

NORTH SEA CONVENTION, 1882, agreement between Britain, Belgium, Denmark, France, Germany, and Holland for allocating respective rights of fishery in North Sea, and also for establishing police regulations.

NORTH SHIELDS (55° N.; 1° 26′ W.), seaport, on Tyne, Northumberland, England; ironworks; shipbuilding yards; incorporated with TYNEMOUTH (*q.v.*).

NORTH STAR, see STARS.

NORTH SYDNEY, residential suburb, Sydney, New South Wales, on N. shore of Port Jackson. Pop., 23,000.

NORTH TARRYTOWN, a village of New York, in Westchester co. It is on the New York Central Railroad and on the Hudson River. 26 miles north of New York City. It is chiefly a residential center and has extensive manufactures, chiefly the making of automobiles. Pop., 1920, 5,922.

NORTH TONAWANDA, a city of New York, in Niagara co. It is on the Erie, the Wabash, the West Shore, the Lehigh Valley, and New York Central railroads, and on Niagara River and Erie Canal. Its industrial interests include the manufacture of lumber and iron products, steel radiators and motor boats. The public buildings include a public library. Pop., 1920, 15,482.

NORTHERN BAPTISTS, an organization of the Baptists of the Northern states who, in 1907, established the Northern Baptist Convention, separate from the Southern Baptist Convention, and managing its foreign missions, etc. independently. It has a membership of a little over 5,000 congregations, and has headquarters in St. Louis, Mo.

NORTHUMBERLAND (55° 15′ N., 2° W.), northernmost county, England; bounded on N. by Berwick and Roxburgh, W. by Cumberland, S. by Durham, and E. by North Sea; area, 2,000 sq. miles; highest point, Cheviot (2,676 ft.). County is well watered by Tweed, Till, Aln, Coquest, Wansbeck, Blyth, and Tyne; valleys fertile and well wooded. Northumberland is one of chief sheep-rearing counties in England; cattle-raising also carried on; chief crops, barley and wheat; important coast and river fisheries; of great industrial importance, coal being chief product. Tyne is centre of manufactures and has enormous shipping trade. Chief towns are Newcastle, Tynemouth, N. Shields, Alnwick, Hexham, and Morpeth.

In VI. cent. Northumberland formed part of Bernicia; later joined with Deira and called *Northumbria*; from Norman Conquest to XVII. cent., scene of many struggles with Scots; contains battlefields of *Otterburn, Homildon Hill,* and *Flodden.* Pop., 1921, 407,000.

NORTHUMBERLAND, DUKE OF, JOHN DUDLEY, VISCOUNT LISLE, EARL OF WARWICK (*c.* 1502-53), Eng. statesman; member of council of regency for Edward VI.; cr. Earl of Warwick, 1547; overthrew protectorate of Somerset, 1549; became chief power in realm and obtained dukedom of N. 1551; misgoverned; married his son, Lord Guilford Dudley, to Lady Jane Grey and induced king to settle crown on latter; defeated by Mary, and executed.

NORTHUMBRIA, most northerly and one of most important of Old English kingdoms, stretching from Humber on S. to Firth of Forth on N., and bounded on W. by Cumbria and Strathclyde; consisted of former kingdoms of Bernicia and Deira; Bernicia said to have been founded by Ida, *c.* 547; first known king of Deca, Ella; two kingdoms united under Ethelfrith, end of VI. and beginning of VII. cent's; Christianized under Edwin in VII. cent.

NORTHUP, CLARK SUTHERLAND (1872), University Professor; *b.* in Edmeston, New York. Graduated from Cornell University in 1893. Teacher of English and Greek for two years at a school in Ithaca, New York. Has been assistant in English, 1895-1907; instructor, 1897-1903; assistant professor of English, 1903-1919 and since then professor at Cornell University. Author of: *A Manual of American Literature,* (with others), 1909; *Studies in Language and Literature* (with others), 1910; *Progressive Studies in English* (with Miss A. Blount), *1911-1914*; *Bibliography of Thomas Gray, 1917*; Editor: *The Essays of Francis Bacon, 1908*; *Essays and Criticisms by Thomas Gray, 1911*; *Representative Phi Beta Kappa Orations, 1915*; *Sartor Resartus, 1921.*

NORTH-WEST FRONTIER PROVINCE (33° N., 72° E.), province in Brit. India, constituted in 1901; consists of districts of Peshawar, Kohat, Bannu, and Dera Ismail Khan, formerly comprised in Punjab; Hazara district; agencies of Malakand (Dir, Swat, Chitral), Khyber, Kurram, Tochi, and Wana; area, *c.* 38,700 sq. miles: capital,

Peshawar. Region is mostly mountainous, Hindu Kush forming northern boundary; highest summits are Tirach Mir (25,400 ft.), and Kachan (22,600 ft.). River valleys and district of Peshawar are most fertile and cultivated parts. Principal rivers are Indus, Kabul, Kurram, and Kunhar. Administration is in hands of commissioner and agent to Gov.-Gen. Leading occupation is agriculture; chief crops—maize, rice, wheat, barley, sugar-cane, grain, tobacco and cotton. Inhabitants, *c.* 2,250,000, are mostly Pathans.

NORTH-WEST PASSAGE, see POLAR REGIONS, GEOGRAPHY.

NORTH-WEST TERRITORIES, division of Canada; area, *c.* 1,200,000 sq. miles; long administered by Hudson's Bay Co. (*q.v.*); bought by Dominion, 1869; out of it were carved provinces of Manitoba, 1870; Alberta, 1905; Saskatchewan, 1905; part of Keewatin district divided between Ontario and Manitoba, and Ungava incorporated in Quebec, 1912. N. W. Territories now comprise undeveloped regions of Canada north of 60° N. (except Yukon), viz. Mackenzie, Franklin, and remnant of Keewatin; governed by commissioner and council of four; inhabited by Indians, Eskimos, and a few white fur-traders.

NORTHWESTERN COLLEGE, a co-educational institution founded in 1861 at Naperville, Ill. The college has received an addition to its endowment fund amounting to $500,000 and $250,000 for building purposes as a result of the "Forward Movement" of the Evangelical Association. During the 1921-2 session the student enrollment amounted to 544, while the teaching staff numbered 38. The library contains 16,000 volumes.

NORTHWESTERN UNIVERSITY, a co-educational institution founded in 1851 at Evanston and Chicago, Ill. It includes the College of Liberal Arts, the Graduate School, and the Schools of Medicine, Law, Engineering, Dentistry, Music, Commerce and Journalism. It has a library containing 125,000 volumes, not including a law library of 25,000 volumes. During the session of 1921-2 there was a student body of 6,590, while the faculty numbered 508.

NORTHWICH (53° 16′ N.; 2° 31′ W.), market town, Cheshire, England, at junction of Weaver and Dane; salt-mines, chemical works. Pop., 18,000.

NORTH YAKIMA, now **YAKIMA**, a city of Washington, in Yakima co., of which it is the county seat. It is on the Northern Pacific, the Oregon and Washington Railroad and Navigation Company, and the Yakima Valley Traction railroads. It is the center of an extensive fruit growing, live stock and dairying region. The public buildings include a hospital and a library. Pop., 1920, 18,539.

NORTON, THE HON. MRS. CAROLINE SHERIDAN (1808-77), Eng. writer; granddaughter of R. B. Sheridan; prototype of *Diana of the Crossways*; married unhappily to Hon. G. C. Norton (1827), from whom she separated; married Sir W. Stirling-Maxwell, 1877. Her best novels are *Stuart of Dunleath, 1847*; *Old Sir Douglas, 1868*; poems include *The Sorrows of Rosalie, 1829*; *The Child of the Islands, 1845*; *The Lady of La Garaye, 1862*.

NORTON, CHARLES ELIOT (1827-1908), an American university professor; *b.* in Cambridge, Mass. He graduated from Harvard University in 1846, was for a while in business and during the Civil War edited the papers of the Loyal Publications Society, afterwards being joint editor with James Russell Lowell of the North American Review. In 1868 he became professor of historic art at Harvard University, being professor emeritus after 1898. He was recognized as the foremost Dante scholar in this country. Among his works are *The Life of Dante, 1859*; *A History of Ancient Art, 1891*; and *Longfellow, 1907*.

NORTON, FREDERICK OWEN (1868), College Dean; *b.* at Brudenell, P. E. I. Educated at Prince of Wales College, P. E. I., and Transylvania College. For a year principal of a grammar school at Hamilton, P. E. I. At New Glasgow, from 1889-1891 principal of a high school. In 1895-1898 associate principal, principal, 1899-1900 of Western College, Missouri. At Christian University, 1898-1899 as regent and professor of Latin. Since 1907 dean of the College of Liberal Arts., and vice-president and professor of educational psychology since 1919 of Drake University. Author of: *A Lexicographical and Historical Study of Diatheke, 1908*; *Christian Bible School Commentary* (co-author), *1912*. Wrote for magazines.

NORTON, THOMAS HEBERT (1851), Chemist; *b.* at Rushford, New York. In 1873 graduated from Hamilton College. In 1878-1883 manager of a chemical works at Paris, France. For seven years at University of Cincinnati as professor of chemistry. Was the first man to travel over Syria and Greece on foot, traveling over twelve thousand miles. Established the consulate at Harput, Turkey, in 1900. Investigated

conditions at Armenia, 1904 and Persia, 1904-1905 for United States Government. Has been American consul at Saxony and Turkey. Author of: *Report on Chemical Industry, Paris Exposition, 1878; Utilization of Atmospheric Nitrogen, 1912; Chemical Industries of Belgium, Holland, Norway and Sweden, 1913; Dyestuffs for American Textile Industry, 1915; Cottonseed Industry in Foreign Countries, 1915; The Dyestuff Census, 1916; Tanning Materials of Latin America, 1917.*

NORUMBEGA, a region on the N. E. coast of North America, marked with its capital city of the same name on old maps as lying between Cape Breton and Florida. It is said to have been occupied by the Norsemen. The city N. is now identified with Watertown, Massachusetts, and the river N. with the Penobscot.

NORWALK, a city of Connecticut, in Fairfield co. It is on the New York, New Haven and Hartford Railroad and on the Norwalk River. It is an important industrial city and has manufactures of paper boxes, stoves, machinery, hardware, cigars, corsets, shirts, shoes, hats, etc. It has also a large coast trade and extensive oyster interests. It now includes S. Norwalk. It has three public libraries, a hospital and a State Armory. Pop., 1920, 27,743.

NORWALK, a city of Ohio, in Huron co. It is on the Lake Shore and Michigan Southern, the Lake Shore Electric, and the Wheeling and Lake Erie railroads. Its industries include the manufacture of pianos, shoes, ploughs, sewing machines, automobile accessories, and tobacco. It has also railroad machine shops. Its public buildings include a public library. Pop., 1920, 7,379.

NORWAY, kingdom, forming W. portion of Scandinavian peninsula, N. Europe (58°-71° 11′ N., 4°-31° E.); bounded N. by Arctic Ocean, E. by Finland and Sweden, S. by North Sea and Skager-Rack, and W. by Atlantic and Arctic Oceans; extreme length, *c.* 1,150 m.; width varies from 20 to 280 m. Area, 124,643 sq. m. Pop., 1921, 2,646,300.

Physical Features. The seaboard is fringed by chains of islands (the Skjærgaard), which render it, in many cases, dangerous of access, though they give continuous lines of smooth-water channel inside. It is everywhere indented by the long, narrow winding inlets, often with sides rising sheer from the sea, known as fjords (fiords); this character gives the country a long inner coast-line of *c.* 12,000 m., and the deep fiords furnish many convenient harbors. The islands— Kvalö, Tromsö, the Vesteraalens, the Lofotens, and the Vigtens— contain about 7 per cent. of the total area. The chief fiords, the Varangen, Alten, Trondhjem (80 m.), Molde, Sogne (106), Hardanger (66), Stavanger (50), and Christiania (90), vary in depth from 220 to over 660 fathoms. Except in the S. and S. E., the coast rises steeply from the sea, and the interior plateau slopes up to the mountains that form the boundary all along the S. E., the Kjolens in the N., with a mean height of from 4,000 to 6,000 ft., and the lower but more widely spread Dovrefjeld in the S., with a mean height of from 2,000 to 4,000 ft. Several peaks attain to over 7,000 ft.; the highest is about 8,400. A large number of long, narrow lakes lie in ice-scooped hollows, and there are numerous short, rapid rivers, the longest being the Glommen (350 m.), flowing S. to Christiania Fjord, and the Tana (175), flowing N. to the Arctic Ocean.

The northerly climate is modified by the Gulf Stream Drifts, which wash the whole of the N. W., and the hills afford considerable protection from the N. E. winds; but the cold is severe in the interior, and as the fiords allow the damp winds of the Atlantic to reach the plateau, the snowfall there is greater than it would otherwise be. Justedalsbrae in the S. (6,800 ft.), and Svartisen (3,600 ft.), in the N. are the largest glaciers; the limit of perpetual snow varies from 3,000 to 5,000 ft.; nowhere is the coast icebound in winter; the N. part is the 'land of the midnight sun.' Norway is chiefly composed of plutonic and metamorphic rocks, granite being the principal soil; everywhere are marks of the Ice Age. The fauna includes elk, reindeer, wolf, glutton, sheep, grouse of largest varieties, wild fowl and sea birds of many kinds, salmon, herring, cod. The fir, oak, ash, birch, elm, hazel, and lime grow in great abundance; hardy fruits, vegetables, and the usual cereals are grown. See Map of Norway, Sweden and Denmark.

Products and Industries.—The small proportion of the country (3 per cent.) fit for cultivation is along the coasts, especially the S., and in occasional depressions along the fiords or lakes; 75 per cent. is of no value, 22 per cent. is under forest. Timber and fisheries consitute the wealth of Norway; 75 per cent. of the farms are under 13 ac. Cattle number over 1,000,000; sheep nearly 1,500,000. Of the forest trees nearly three-quarters are pines; unwrought and sawn timber, wood-pulp, matches, etc. The fisheries are very valuable, the chief being cod and ling; whales, walrus, seals, and sharks are taken in the N. Cod-liver

oil is made and exported in large quantities. The principal crops are oats, barley, rye, potatoes, and wheat. The minerals—copper, silver, pyrites, felspar, etc.—are increasing in value. Norway is one of the great carrying countries of Europe. Principal exports are animal produce, timber and wooden goods, minerals and metals, tallow, etc.; chief imports, comestibles (including spirits), coal, minerals, manufactured metals and minerals, textiles.

Government.—The monarchy is constitutional and hereditary in the male line; if the king has no male heir he may suggest a successor, but the decision rests ultimately with the Storthing. The constitution dates from 1814; by it the crown has the right to veto a bill twice, an appeal to the country being made on each occasion, and if the third Storthing again passes the bill it becomes law. There is a royal council. All males of 25 and over elect the members, and since 1913 women have the same privileges, and may (since 1915) be members of council of state. The Storthing is composed of two houses, the Lagthing (upper) and Odelsthing (lower). The 20 local districts or Amts are governed by an Amtmand and have an Amtsthing; the Amts consist of towns and rural communes. The supreme law court is the Höiesteret; in each legal dist. (Herred), of which there are 104, there is a court of first instance, the Forlikskommission; criminals whose offences involve serious punishment are tried by jury (Lagmandsret). Norway prohibited the use of alcoholic beverages by vote (1919). Men between 18 and 55 are liable to serve in the army; sailors between 20 and 44 are liable to service in the navy. Education is compulsory from 6 or 7 to 14 years of age. Christiania has a univ. The established church is Evangelical Lutheran. The cap. is Christiania; the other important towns are Bergen, Trondhjem, Stavanger, and Drammen. There are some 2,000 m. of railway, of which over four-fifths belong to the state; the mercantile marine of 3,424 vessels has a net tonnage of 1,508,758.

History—Many of the Viking pirates of the VIII. cent. sailed from Norway, which was at that time ruled by many chiefs or kings, and divided into several states, each with its separate Parliament or Storthing. Harold Harfager, 960-930, united Norway under his own rule, driving his rivals to carve out new principalities for themselves in the Orkneys, Hebrides, Man, etc. The great Olaf Tryggvesson, 995-1000, introduced Christianity into Norway, and under Olaf II., 'king and saint', 1016-28, the Norwegians were thoroughly Christainized. Olaf II. was forced to fly before Canute in 1028. His son Magnus was restored in 1035, reigned only by aid of his uncle Harold Hardrada, who succeeded him in 1047, and was slain at Stamford Bridge in 1066. His successors were engaged in conflicts with the Church and nobles, until in 1240 Haco the Old, 1217-63, firmly established the power of the crown. He also conquered Iceland and Greenland. His son Magnus, 1263-84, however, surrendered the Hebrides and Isle of Man to Scotland. Haakon V., 1299-1319, last male descendant of Haro Harfager, was succeeded by Magnus Erikson, 1319-43, of Sweden, of the Folkunger line, but Norway and Sweden were separated by Magnus's abdication from Norway in favor of his son, Haco VI., 1343-80.

The minority of Olaf V., 1380-87, was marked by the rule of Margaret of Denmark, who after Olaf's death made the Union of Kalmar, 1397, uniting the three kingdoms of Norway, Denmark, and Sweden. After a vain attempt to throw off the yoke, Norway was forced in 1450 to make a treaty of perpetual union. Christain III., 1534-59, made a revolt against his rule the pretext for treating Norway as a subject state, and Dan. language and law gradually superseded Norwegian.

Norway exchanged Denmark for Sweden as a ruler in 1814, when by the Treaty of Kiel Sweden received Norway as a reward for joining the coalition against Napoleon. A Swed. army terrorized the Storthing into accepting Charles XIII., king 1814-18, he, however, accepting the new constitution. Throughout the century Norway clamored for independence, and a strong republican party opposed the autocracy of the King of Sweden. At last the successive efforts of the Radical premiers Sverdrup, Steen, and Michelsen resulted in 1905 in the establishing by plebiscite of Norway as a separate kingdom under Prince Charles of Denmark, who became Haakon VII.

Literature—Norwegian is a Scandinavian tongue closely akin to Danish. From the days of the sagas until the XIX cent. Norweg. literary men wrote in Danish. Wergeland, 1808-45, was inspired by the new patriotism originating in 1814; Welhaven, 1807-73, set up a standard of form. Wergeland's sister, Camilla Collett, wrote *Amtmandens Dötre, 1855*, which contended for 'the emancipation of the Scandinavian women.' They have erected an independent language alongside of Danish which can already boast of a literature of its own, including at least one poet (O. Vinje), one novelist (Arne Garborg) of real genius, by far the best writer of peasant tales (Jens Tvedt), whom Norway has yet produced, and Ivar Aasen, the lexicographer of the

maal. On the other hand, nearly all the great modern Norweg. writers, such as Ibsen, Björnson, Jonas Lie, Alex. Kjelland, Amalie Skram, Thos. and W. Krag, Christian Elster, Knut Hamsun, and Hans Aanrud, write in what, despite a large admixture of Norse words and expressions, is practically Danish. Within the last three decades Norway has contributed notably to scientific literature. Among many eminent scholars may be mentioned P. A. Munch and Rudolf Keyser, the founders of the Norweg. historical school; E. Sars, the greatest of Norweg. historians; the philosphers Treschow and Monrad; the philologists Unger, Fritzner, and Sophus Bugge; and the explorers Nansen and Amundsen.

NORWEGIAN SEA, part of North Atlantic Ocean between Norway and Greenland, and between Artic Ocean and about lat. 61° N.

NORWICH.—(52° 38′ N., 1° 15′ E.), city, county, parliamentary and municipal borough and county of itself, in Norfolk, England; beautifully situated on Wensum River; contains fine Norman cathedral. Chief industries—engineering-works, breweries, tanneries, and brickworks; manufactures include chemicals, starch, and mustard. Pop. 1921, 120,653.

NORWICH, a city of Connecticut, in New London co., of which it is one of the county seats. It is on the Central of Vermont and the New York, New Haven and Hartford railroads, and on the Thames river. It includes several villages. It is an important industrial city and has manufactures of fire arms, locks, cotton goods, woolen goods, ribbons, electrical supplies, machinery, harness, etc. It has several public libraries and a hospital. Pop. 1920, 29,685.

NORWICH, a city of New York, in Chenango co., of which it is the county seat. It is on the Lackawanna and the New York, Ontario and Western railroads, and on the Chenango river. Its industries include blast furnaces and the manufacture of pianos, hammers, carriages, drugs and medicine, silk goods, chairs, machinery, etc. It has several libraries and a court house. Pop. 1920, 8,268.

NORWICH UNIVERSITY, an educational institution founded as the American Literary, Scientific and Military College, in Northfield, Vt. It was removed to Norwich, Conn., in 1829, where its present name was assumed, in 1834, and in 1866, brought back to Northfield after a fire had destroyed its buildings. In 1898, it became the official state military school, for which it receives state support. In 1922, the faculty numbered 22 and the students 293.

NORZAGARAY (14° 40′ N., 125° E.), town, Luzon, Philippine Islands.

NORWOOD, a city of Massachusetts, in Norfolk co. It is on the New York, New Haven and Hartford railroad. Its industries, which are important, include the manufacture of canned goods, iron products, leather goods, ink and glue. There are also several large printing shops and book binderies. Its public buildings include a hospital and a memorial library. Pop. 1920, 12,627.

NORWOOD, a city of Ohio, in Hamilton co. It is on the Baltimore and Ohio, the Southwestern, and the Cincinnati, Lebanon and Northern railroads. It is a residential suburb of Cincinnati and has also important industries, including the manufacture of playing cards, pianos, washing machines, iron working machinery, etc. Pop. 1920, 24,966.

NOSAIRIS, people who preserved their independence in the mountains of N. Syria for 500 years; found also in Antioch, Tarsus, and Adana; estimated at from 120,000 to 150,000. Though under Turk. rule since 1832, they have never accepted Islamism (or Christianity), but retain a mystic and mysterious faith.

NOSARI, NAVSARI (20° 54′ N., 73° E.), town, state of Baroda, Bombay, India; cotton-weaving. Pop. 17,000.

NOSE, see Olfactory System.

NOSOLOGY (Gk. *nŏsos*, disease; *lŏgos*, science), that branch of medicine which treats of the distribution and arrangement of diseases into classes, orders, etc. The most popular system is that of Dr. Farr, which has taken the place of Cullen's; also of the collection of evidence as to whether a particular condition should be regarded as a special disease.

NOSTALGIA, home-sickness, particularly so great as to cause melancholia.

NOSTRADAMUS, OR MICHEL DE NOTRE DAME (1503-66), a French astrologer, of Jewish extraction, *b.* at St. Remy, Provence. For many years he practiced as a physician, and gained high reputation for his skill in stemming the tide of the great plagues of Lyons. His *Centuries* was published in 1555, and aroused universal interest and excitement. Lives of the astrologer have been written by Jaubert (*Vie de M. Nostradamus*) and Bareste (*Nostradamus*).

NOTARY, NOTARY PUBLIC, official whose business it is to take notes of matters affecting the public; acts chiefly in commercial transactions, attesting deeds and other documents to make them authentic in foreign countries.

NOTO (36° 54′ N., 15° 4′ E.), town, Syracuse, Sicily; trade in oil, wine. Pop. 24,000.

NOTOTHERIUM, a genus of extinct marsupials, the remains of which are found in the Post-Tertiary of Australia. It differed from Diprotodon chiefly in its dentition.

NOTRE DAME, see PARIS.

NOTRE DAME DE LORETTE, hill rising steeply from Ablain-St. Nazaire, and running E. and W. for 6 m., Pas-de-Calais, France (50° 23′ N., 2° 42′ E.), 1 m. N. W. of Souchez, and dividing the coal region from the chalk. It was a strongly organized position in the Ger. defense lines on the Western front; on the crest N. of Albain-St. Nazaire stood the Chapel of Our Lady; the ridge resisted many Fr. attacks before it was valiantly carried in the Artois offensive, May 22, 1915; the plateau was finally cleared and the line straightened out during the battle of Loos, Sept. 25, 1915. Its central position and its tragic memories have led to its choice as the site of a great basilica to commemorate the Allied dead.

NOTRE DAME UNIVERSITY, a Roman Catholic institution founded in 1842, at Notre Dame, Ind. It includes departments of arts and letters, sciences, engineering, commerce and law. It has a library of 145,000 volumes. In the fall of 1921, there was an enrollment of 1,490. The number of the faculty numbered 103, of whom 50, members of the religious order of the Holy Cross, were giving their services gratuitously.

NOTTINGHAM (52° 57′ N., 1° 8′ W.), city, county of city, municipal, parliamentary, county borough, on Trent Nottinghamshire, England; Castle now used as art museum; manufactures hosiery, lace, cotton, wool, machinery, and chemicals. Nottingham played a prominent part in Civil War. Pop. 1921, 262,658.

NOTTINGHAMSHIRE, NOTTS (*c.* 53° 5′ N., 1° W.), midland county, in Trent basin, England; area, 843 sq. miles; surface level along Trent, elsewhere undulating, rising to *c.* 600 ft.; drained by Trent and its tributaries; crossed by several canals and by leading northern railways; contains Sherwood Forest, traditionally associated with Robin Hood; county town, Nottingham. N. produces coal, iron, gypsum, limestone; manufactures lace, hosiery. Pop. 1921 378,476.

NOÜMENON, the reality underlying phenomena; the thing-in-itself.

NOUN, from the Latin *nomen,* name. In grammar the word which denotes any object spoken of, whether animate or inanimate. Nouns are proper when they are the names of individual persons or things; common, when they are the name of a class of things.

NOURSE, EDWIN GRISWOLD (1883), Economist; *b.* at Lockport, New York. In 1906, graduated from Cornell University. At Lewis Institute, 1904-1905, as teacher of English. From 1906-1908, teacher in Ogden, Utah, High School, of history and civics. At University of Pennsylvania from 1909-1910, as instructor of finance. Professor and head of department of economics and sociology, 1910-1912, at University of South Dakota and same, 1915-1918 at University of Arkansas. Since 1918, chief of agricultural economics section of Iowa State Experiment Station. Author of: *Brokerage, 1910*; *Agricultural Economics, 1916.* Wrote articles for reviews and journals.

NOVALIS, FRIEDRICH VON HARDENBERG (1772-1801), Ger. poet and dramatist; wrote *Heinrich von Ofterdingen* (prose romance), *Geistliche Lieder* (spiritual poetry), etc.

NOVARA (45° 30′ N., 8° 35′ E.); town, N. Italy; seat of bishopric, has cathedral dating in part from V. cent.; here Austrians defeated Sardinians, 1849. Pop. 59,000.

NOVATIAN (III. cent.), Rom. priest; chosen by minority as bp. of Rome, 250; his followers called *Novatians.*

NOVA SCOTIA, mar. prov., Canada (45° N., 64° W.); most easterly of dominion; connected with New Brunswick by narrow isthmus at end of Bay of Fundy; consists of Nova Scotia proper and Cape Breton Island, separated by Gut of Canso. There are numerous excellent harbors; coasts subject to fogs; many rivers and lakes. The surface is hilly and soil fertile. Principal towns are Halifax (cap.), Sydney, Glace Bay, Amherst, Yarmouth, Pictou. Cereals, apples, pears, plums, and potatoes grow well, and there is excellent pasturage; extensive coal mines; iron mined and smelted; gold found; valuable fisheries, and forests are important; timber, fruit, agricultural produce exported. There are 1,600 m. of railway, and facilities for transport

are excellent. Nova Scotia was discovered by John Cabot in 1497; named Acadia by the first Fr. settlers, 1604; claimed by English and renamed Nova Scotia, 1621; finally ceded to Britain, 1713; Cape Breton annexed, 1763; joined the Dominion of Canada, 1867. Nova Scotia has a lieut.-gov., executive council, legislative assembly, and council (woman franchise was passed in 1918). Dalhousie and several sectarian universities. Area, 2,142 sq. m., of which 360 sq. m. are water; pop. 1921, 525,000. See Map of Canada.

NOVAYA ZEMLYA, NOVA ZEMBLA (71° N., 55° E.), two Russ. islands in Artic Ocean; divided by the narrow channel Matochkin Shar, and separated from Waigatz Island by Kara Strait; length about 600 miles, breadth, 80 miles; area, 35,000 sq. miles. Whale, walrus, and seal fisheries; discovered by Willoughby, 1553; explored by Barents, Borough, Count Lütke, Von Baer, Grinevetskiy, Ekstam, etc.

NOVEL, in its modern signification, is a prose narrative of considerable length, having a well-defined plot, and showing intimate observation of character and custom. The history of the novel commences in Greece with the *Cyropædia* of Xenophon, and the Gr. romance-writers of the Græco-Roman period show considerable dexterity in plot construction and variety of incident. The Lat. romance-writers borrowed and transcribed from the Gr. school, the best Lat. romances being the *Golden Ass* of Apuleius and the *Satyricon* of Petronius Arbiter. During the Middle Ages the romance writers drew their material chiefly from eastern sources. Boccaccio ranks highest among mediæval story-tellers. The *Morte d' Arthur* of Sir Thomas Malory, which is the forerunner of the Eng. novel, was drawn from the *Arthurian Legends* and the *Chansons de Geste*. The domestic novel owes its origin to the epistolary narratives of Samuel Richardson, whose *Pamela* is the true prototype of modern fiction; and at the beginning of the XIX. cent. Sir Walter Scott introduced the historical novel.

NOVELDA (38° 27′ N., 0° 45′ W.), town, Spain.

NOVEMBER (from Lat. *novem*, 'nine,' because ninth month of Rom. year), eleventh month; contains 30 days, one was temporarily added in the Julian era.

NOVGOROD.—(1) Government, European Russia (59° N., 34° 30′ E.), drained by upper waters of the Volga; crossed by several canals; mountainous in S.; fishing, shipbuilding, lumbering; glass, matches, liquors. Area, 45,770 sq. m.; pop. 1,729,300. (2) Cap. of above, on Volkhov R., near Lake Ilmen. On left bank of river is ancient Kremlin, walls of which at one time enclosed many churches and other buildings. Other interesting features are Cathedral of St. Sophia, and many eccles. buildings. Novgorod was formerly independent and of great importance, but in 1570, was almost destroyed by Ivan IV. of Moscow, and never recovered. Pop. 28,400.

NOVI LIGURE (44° 45′ N., 8° 46′ E.), town, Piedmont, Italy.

NOVIBAZAR, YENIPAZAR (43° 4′ N., 20° 35′ E.), chief town of Sanjak (district) of Novibazar, strip of Jugo-Slav territory between Serbia and Montenegro; high strategical importance; under Austrian military occupation, 1879-1908; taken by Montenegrins and Serbians, 1912, and joined to Serbia. After the World War it became a part of Jugo-Slavia. Pop. 10,000; (Sanjak) 170,000.

NOVICE, an appellation given to persons of either sex, who live in a monastery in a state of probation, before becoming professed members of a monastic order. The N. must have attained puberty before entering, and remain at least twelve months. Any one new at a business is also termed a N.

NOVOCHERKASSK (47° 27′ N., 40° E.), town, on Don, Russia; cereals, wine. Pop. 76,000.

NOVO GEORGIEVSK.—(1) Or Modlin, tn. and fortress, Poland (52° 26′ N.; 20° 47′ E.), 26 m. N. W. of Warsaw, on r. bk. of Vistula at its junction with the Narev; by a strong attack from this direction Russians defeated Ger. assault on Warsaw, Nov., 1914; in their great retreat, 1915, the Russians left 25,000 men in the fortress so as to impede Ger. supplies to the advancing armies; Germans employed 120,000 men in the siege, and the Russian gunners in their ringed entrenchments exacted a heavy penalty from the enemy; the struggle finally came to a hand-to-hand fight; the fortress held up the Ger. advance for a fortnight before it fell, Aug. 24, 1915. (2) Or Krylov, tn., Kherson, Ukraine (49° 4′ N., 33° 2′ E.); trades in timber, grain, cattle. Pop. 12,500.

NOVOROSSIYSK (44° 43′ N., 37° 46′ E.), seaport, capital of Chernomorskiy Territory, Russia, on Black Sea; export cereals. Pop. 44,000.

NOWGONG.—(1) (25° N., 79° 30′ E.), town, cantonment, Bundelkhand, Central India. Pop. 12,600. (2) (26° 16′ N., 92° 42′ E.), town, cap. of N.

district, Assam, India. Pop. 5,500; (dist.) 265,000.

NOYES, ALFRED (1880), Eng. poet and critic; educated at Oxford Univ.; gave the Lowell lectures in America on *The Sea in English Poetry, 1913*; appointed prof. of Eng. literature in Princeton Univ., 1914; began publication with *The Loom of Youth*, a volume of verse, in 1902; other works include *The Flower of Old Japan, 1903*; *Poems, 1904*; *Drake (an Eng. epic, 1908)*; *The Enchanted Island Other Poems, 1909*; *A Tale of War, 1914*; *A Salute from the Fleet, 1915*; *Mystery Ships, 1916*; and *William Morris* in English Men of Letters, 1908.

NOYES, ARTHUR AMOS (1866-), an American chemist, *b.* in Newburyport, Mass. He graduated from the Massachusetts Institute of Technology, in 1886, then continued his studies in the University of Leipzig, Germany. After he had finished his studies he became assistant professor of analytical chemistry at the Massachusetts Institute of Technology, where he remained until 1909, when he was acting president of the institution. Since 1915, he has been director of the Gates Chemical Laboratory, in California. Among his works are *A Course of Instruction in Qualitative Chemical Analysis of Inorganic Substances, 1895*; *The General Principles of Physical Science, 1902*; *The General Principles of Chemistry*, (with M. S. Sherrill, 1913).

NOYES, HARRY ALFRED (1890), Research Chemist; *b.* at Marlborough, Massachusetts. In 1912, graduated from Massachusetts Agricultural College. At Purdue University Experiment Station from 1913-1916, as research assistant in chemistry and bacteriology and research associate at same university from 1916-1918. Since 1918, research work with Mellon Institute of Industrial Research and School of Specific Industries, Pittsburgh. Contributed to journals on bacteriology and chemistry.

NOYON, anc. tn., dep. Oise, France (49° 35′ N., 3° E.), on r. bk. of Oise, 56 m. N. N. E. of Paris; Charlemagne crowned here, 768; birthplace of Calvin, 1509-64; manufactures of textiles and leather, and sugar refining; cathedral (XI. and XII. cent.), episc. residence and town hall; during World War was scene of a fierce engagement, Sept., 1914, when French were attempting to turn Ger. right flank; after trench warfare began it lay in apex of the whole Ger. front in northern France; occupied by French, March 18, 1917, during Ger. retirement to Hindenburg Line; regained by Germans in their offense, March, 1918, but French barred progress S. along the Oise; finally abandoned by Germans, Aug. 29, 1918.

NUBAR PASHA (1825-99), Egyptian statesman; successively sec. to Boghos, Mehemet Ali, Ibrahim Pasha, Abbas Pasha, and Said; organized railway communication between Cairo and Suez; on Said's death, 1863, sent by Ismail Pasha to obtain permission from sultan for completion of Suez Canal and to settle differences with France; Minister of Foreign Affairs, 1866, abolished separate courts of foreign nations in Egypt for civil actions.

NUBIA, region in N. E. Africa, stretching roughly from Red Sea to Libyan Desert, and southward from Egypt (*c.* 20° N., 32° E.), but has no definite limits. In early times known as Ethiopia. Greater part of surface consists of sandy deserts and steppes; productive districts lie mostly in valley of Nile; chief towns—Khartum, Omdurman Wadi Halfa, and Dongola. Inhabitants are Hamitic people and Arabs. Nubia is included politically in Egypt or Anglo-Egyptian Sudan. See Map of Africa.

NUBLE (37° S., 72° W.), inland province, Chile, bordering Argentine Republic. Pop. 1920, 170,425. Capital, Chillan.

NUCLEUS, a small central nodule present in each plant and animal cell, and intimately concerned with the phenomena of growth and reproduction. It is composed of many chromatin elements. In some single-celled animals—Protozoa—there are two nuclei: a larger elongated *macro-* or *mega-nucleus*, which stains deeply, and a smaller *micronucleus*, difficult to stain. The latter is more intimately concerned in sexual reproduction than the former. See Ovum.

NUEVA SAN SALVADOR, SANTA TECLA (13° 40′ N., 89° 20′ W.), town, Salvador. Pop. 1922, 23,291.

NUEVO LÉON (25° 30′ N., 99° 40′ W.), state, Mexico, on E. slopes of Sierra Madre; chief product, sugar. Pop. 375,000. Capital, Monterrey.

NUGENT, JOHN F. (1868), a U. S. public official, *b.* in La Grande, Ore. After finishing his public school education, in Silver City, Idaho, he studied law and began to practice there, in 1898. He was prosecuting attorney for Owyhee County for four terms, was active in Democratic party politics and in 1918, was appointed U. S. Senator by Gov. Moses Alexander, to fill the vacancy caused by the death of James H. Brady. He resigned in 1921, to become a mem-

ber of the U. S. Federal Trade Commission.

NUISANCE, in legal parlance, that which is harmful or discomforting to one's neighbors. N. may be private, as the presence of anything which would make a neighbor's house unhygienic; or public, as the presence of anything (insanitary sewers, cellars, etc.) dangerous to the community at large.

NUKHA (41° 10′ N., 47° 10′ E.), town, Elizavetpol, Russian Transcaucasia; silk industries. Pop. 26,000.

NULLIFICATION, in the history of the United States, a term used to denote the action of a state for rendering null and void any Act of Congress, or Federal Act, regarded by the state as unconstitutional. The application of the doctrine of N., or, more fully, N. and secession (*i.e.* from the Union) received its strongest expression in S. Carolina in 1830, during the agitation against the nortorious Tariff Act of 1828, which imposed excessive duties on raw material and imported manufactures, and which has ever since been known as the 'Tariff of Abominations.' The doctrine of N. is associated largely with the name of John C. Calhoun of S. Carolina, then vice-president, but afterwards senator, who, in response to the invitation of the political leaders of S. Carolina, wrote the celebrated *South Carolina Exposition* of 1828, a document which after opening with the assertion of the unconstitutionality of the Tariff Act, discusses the right of the state to declare the Act null and void within the ambit of its own territory. The S. Carolina 'Nullifiers,' having obtained no relief from Congress up to 1831, inaugurated a campaign for the calling of a state convention to nullify the tariff. This policy at once split the whole country into two factions—the 'Nullifiers' or 'the State Rights and Free Trade Party,' and the 'State Rights and Union Party.' Congress then made various concessions by amending the Tariff Act, in spite of the fact that the Nullifiers failed to secure a two-thirds majority of each branch of the Federal legislature. But as the Act had not yet actuany come into effect the Nullifiers did not abate their efforts, and at the ensuing election carried all before them, with the result that a state convention held soon afterwards solemnly declared the Tariff Act (and its amending Act) null and void (Ordinance of Nullification). But the antipathy between North and South was too deep to allow the Nullifiers to win in the long run, and after the struggle over the Force Bill (empowering Jackson to collect the tariff duties in S. Carolina by force), a compromise was effected and the Ordinance of Nullification repealed.

NUMA POMPILIUS (715-672 B. C.); traditional second Rom. king; reputed author of innumerable religious institutions and legal reforms.

NUMANTIA (*c.* 41° 45′ N., 2° 30′ W.), ancient town, on Douro, Spain; taken by Romans, 133 B. C., after long heroic defense.

NUMBERS, BOOK OF, in Old Testament, fourth of the Mosaic books; like *Exodus*, is compounded of the combined Jahvistic and Elohistic narrative, JE, with the Priestly Code P, and contains the story of the Israelites from the second to the fortieth years of the Exodus. Chaps. 1-10[28] are all from P, and describe the camp and the functions of the Levites. The dual structure of N. is shown in 13-14, where there is plainly a two-fold story of the spies, and again in 16-17—Korah's revolt—the combination is obvious; 26-36 are all from P, except part of 32.

NUMBERS, PARTITION OF, theory originated by Euler. In it we regard numbers as made up by addition of parts. Thus partitions of 4 are 31, 22, 211, 1111. *Classes of Partitions*: (i) into given number of parts, or (ii.) not more than given number of parts; (iii.) into given parts, with or without repetitions. Partitions are obtained from 'partition functions.'

NUMERAL, symbol or figure used to represent number. Earliest n's appear to have been hieroglyphical, as with the Egyptians, but were of little arithmetical value. Chaldeans, Hebrews, and Greeks used letters of alphabet for figures, first 9 letters denoting units, second 9 tens, 4 others with 5 accented ones hundreds, and so on. Greeks continued this notation to tens of thousands, and taking M as 10,000, by combinations with other numerals could reach 100,000,000. Roman numerals (still used) were I, II, III, IIII, V (5), X (10), L (50), ⊏, later C (100), Io, later D (500), M or clo (1000), and so on. Some of these are derived from others; thus V is half of X, L half of ⊏. N's used now are of Indian origin, and it was not until adoption of this decimal system that arithmetic made any great progress.

NUMERATION, the art of expressing in characters any number proposed in words, or of expressing in words any number proposed in characters.

NUMIDIA, ancient North African state, between Rom. province of Africa and northwest state of Mauretania.

where modern Algeria lies; named after its nomad population; divided into tribes of Massyli (Eastern) and Massæsyli (Western); cavalry important in Punic Wars; became Roman province, 46 A. D. See ALGERIA.

NUMISMATICS is the science which deals with coins and medals. The most rudimentary system of exchange is the barter system, by which any kind of property is used for the purchase of the required commodity. At a later stage a fixed metallic weight becomes unit of exchange. The use of metals as weights, however, is to be distinguished carefully from the coinage system, by which the pieces of metal are stamped with an official impress guaranteeing just weight and value. The invention of such a stamp is attributed to the Lydians. The early Lydian coins were bean-shaped ingots; the obverse was plain, while the reverse bore incuse sinkings. The earliest Lydian coins have been attributed to Gyges, who flourished in the VIII. cent. B. C., but probably the coinage was invented at a much earlier date. Later Lydian coins show on the obverse a lion's head, and on the reverse incuse depressions.

Crœsus (568-554 B. C.) substituted a currency of pure gold and pure silver for primitive electrum of the Lydians. His 'stater' bears on obverse the fore-quarters of a bull and a lion, and on reverse a double incuse. Darius (522-485 B. C.) founded the Pers. coinage. His gold stater, called the Daric, was current in the Ionian states and the Aegean islands; it shows on the obverse the figure of the king kneeling, and holding in his right hand a spear and his left hand a bow. The introduction of the coinage system into Greece is assigned to Pheidon, Tyrant of Argos, who flourished about 750 B. C. His coins bear the impress of a tortoise, an animal sacred to Aphrodite, in whose temple at Aegina the coins were issued. In 590 B. C. Solon first introduced the silver tetradrachm at Athens; on the obverse of the coin is the head of Athena, patron goddess of the city, and on the reverse the owl, a bird associated with the goddess. Towards the close of the Pers. wars the Gr. coins exhibit great beauty in conception and execution. From 480 B. C. the names of cities and their chief magistrates begin to occur on Gr. coins. About this time the Athenian stater was the chief unit of exchange in Greece, but the Corinthian stater, with the figures of Pegasus on the obverse, had a wide circulation.

About 400 B. C. numismatic art in Greece attained its highest excellence. The most general type has the head of a divinity on the obverse, while the reverse has a mythological or agonistic subject. Of this type is the famous Syracusan medallion, which is judged to be the finest example of numismatic art in the world. All the large cities of Greece had at this time independent mints, but the conquests of Philip of Macedon imposed the Macedonian stater on the states of Greece, and the independent mints ceased to coin their individual types. From the time of Alexander the Great the head of the reigning monarch began to take the place of the ideal head of the divinity on the obverse, and the portraiture is distinguished by its uncompromising realism. As historical sidelights the series of numismatic portraits of the kings of Syria, Macedonia, Egypt, Pontus, Bithynia, and Pergamum are invaluable.

The first Jewish shekel was struck by Simon Maccabæus *c.* 140 B. C. During the Græco-Roman period the Gr. states issued bronze coins with representations of various local cults and institutions. Roman coinage never attained to the excellence of the Gr. coins issued during the period of the Athenian and Spartan supremacy. About 350 B. C. circular pieces of bronze, a Roman pound in weight, were stamped with the head of Janus on the obverse and the prow of a ship on the reverse. The republican silver money bears representations of events connected with the family history of the *Triumviri Monetales*. In the year 2 B. C. Augustus assumed the control of the gold and silver coinage, and during the empire Roman coins bore on the obverse the head of the emperor or a member of his family, and on the reverse allegorical, historical, or architectural subjects.

Before the coming of the Anglo-Saxons, the Britons had an independent coinage modelled after Phœnician coins introduced by traders. The chief Anglo-Saxon coins are *skeattas*, *stycas*, *heptarchial pennies*, and *ecclesiastical pennies*; but Eng. coins are not characterized by any remarkable artistic merit prior to the currency during the reign of Edward III. The coins of this soverign first bear the inscription 'Dei Gratia' and the title 'Rex Franciæ.' The gold coins of this period were called *nobles* and *angels*. Henry VII. first coined the sovereign. The coins issued by Cromwell during the Protectorate are exceptionally fine; the obverse bears the laureated bust of the Protector, while the reverse bears a crowned shield with the harp and crosses of St. George and St. Andrew.

NUMMULITES, a genus of mostly extinct gigantic Foraminifera, found as far back as Carboniferous times; disc-

like, and sometimes as large as a half-crown.

NUNCIO, see LEGATE.

NUNEATION (52° 32′ N.; 1° 28′ W.), town, Warwickshire, England; ribbons; ironworks. Pop. 1921, 41,894.

NUPE (9° 20′ N.; 5° E.), province Northern Nigeria, formerly a native kingdom. Pop. 155,000. Capital, Bida.

NUREMBERG (Ger. *Nürnberg*), a city of Bavaria in the prov. of Middle Franconia, 100 m. N. W. of Munich. It is the commercial capital of Bavaria, and lies in a sandy but productive plain. Formerly among the richest of the free imperial towns, it still retains its ancient walls and moat as well as some of the interesting old gateways, and many of the old towers. The castle (Kaiserschloss), picturesquely situated on a rock on the N. side of the town, dates from about the beginning of the XI. cent., and was a favorite residence of the German emperors in the later middle ages. The city also contains several interesting churches, among the best being those of St. Lawrence, the masterpiece of the sculptor Adam Krafft; St. Sebald, with it celebrated shrine consisting of a bronze sarcophagus and canopy; and the church of Our Lady, which contains the Tuchersche altar. Among other public buildings are the Renaissance town hall, the Germanic national museum, which includes a picture gallery containing works by Holbein, Dürer, and others, and the municipal library with about 80,000 volumes, and 2,000 valuable manuscripts. The city is an important commercial center, and is the chief market in Europe for hops. The principal manufs. are fancy articles in metal, carved wood, and ivory, 'Dutch' toys and clocks, and lead pencils. N. was the first of the imperial towns to embrace Protestantism. Pop. 335,000.

NURSING.—In early times and in the Middle Ages nursing, like hospitals, was in the hands of the religious orders and under the management of the clergy; but after the Reformation it became, in Protestant countries, dissociated from religion, and thus declined in esteem and fell into the hands of menials. The modern development of nursing began, again under a religious influence, with the foundation of the Kaiserwerth Institute in Prussia in 1836, which was soon followed by similar institutions, not only in Germany, but in England, U. S., and other countries, the first in England being the Institution of Nursing Sisters, founded in London in 1840 by Mrs. Fry. The organization of a service of nurses to care for the wounded in the Crimean War by Miss Florence Nightingale, 1820-1910, who was trained at the Kaiserwerth Institute, gave a great impetus to nursing, and the first training school for nurses on the lines in vogue today was founded with the money subscribed as a national recognition to Miss Nightingale.

During the World War nursing reached a high state of development. In all the countries at war thousands of nurses were recruited and trained for service on the field and in the hospitals at home. The Red Cross and other great organizations trained great numbers of nurses who rendered excellent service. Nurses in the field showed great courage, and many were killed and wounded in active service.

NUT (Bot.), a one-celled fruit with a woody pericarp, the shell, and often partially or wholly enveloped in a cupule formed by the more or less complete fusion of the floral bracts, as in the oak and hazel. Many so-called n's are of considerable commercial importance, but these do not always come within the strict definition given above. Some are the source of oils, *e.g.* palm n. and candle n., whilst others, *e. g.* almond and walnut (both really drupaceous), are edible.

NUTATION (Lat. *nutatio*, nodding), a movement of the earth's axis, causing an apparent advance and recess of the stars to the pole, and an oscillation of the equinoctial points regularly increasing and decreasing the longitudes and right ascensions of the stars. It is due to the varying actions of the moon and sun on the equatorial protuberance of the earth, which cause the precessional circle to be wavy. There are strictly three Ns.: *Lunar nutation*, due to the revolution of the moon's nodes, with a period of 18½ years, amount 9·2″; *Monthly nutation*, due to changes of moon's declination, too small for measurement; *Solar nutation*, due to the changing declination of the sun, period one year, amount 1·2″.

NUTCRACKER, or *Nucifraga*, a genus of birds of the crow family, *N. caryocatactes*, occasionally visits Britain. It is about the size of a jackdaw, having a brown back, with long white spot on each tail, dark brown head, white tipped outer tail-feathers, black feet, and a black bill. In flight and habits it resembles the jay. It feeds on fruit, a variety of insects, and also the eggs and young of small birds. The nest is a big clumsy structure, and in it about three eggs are laid, which are very light green, spotted with pale brown.

NUTHATCHES, SITTIDAE, a family of small tree-climbing passerine birds, with 60 species; found in almost every

part of the world, except S. America and the greater part of Africa.

NUTLEY, a town of New Jersey, in Essex co. It is on the Erie Railroad and the Morris Canal. It is chiefly a residential suburb of New York. It has manufactures of paper and wool. Pop. 1920, 9,421.

NUTMEG, seed of *Myristica fragrans,* a tree indigenous to Moluccas; fruit, a berry which splits and exposes the central seed, enclosed by a red aril, the 'mace' of commerce. N. is strongly aromatic and used as spice; it yields n. butter and n. oil.

NUTRITION. See DIGESTION; FOOD.

NUTTALL, THOMAS (1786-1859), Amer. botanist and ornithologist.

NUX VOMICA, drug consisting of the seed of a tree, *Strychnos Nux Vomica,* growing chiefly in India, and Farther India; seed is disc-shaped, depressed in center, grey in color, and of somewhat silky appearance, and its chief constituents are the alkaloids strychnine (*q.v.*) and brucine; tincture and extracts are used medicinally, chiefly as tonics in dyspepsia and other gastro-intestinal conditions, *e. g.* Nux Vomica Compound.

NYACK, a village of New York, in Rockland co. It is on the New York, Ontario and Western, the Erie and the West Shore railroads, and on the Hudson river, opposite Tarrytown, with which it is connected by ferry. It is an attractive residential place and has boat building yards, plants for the making of shoes, sewing machines, carriages, etc. Pop. about 5,000.

NYASA (12° S., 34° 40′ E.), lake, East Central Africa; enclosed by German East Africa, British Central Africa, and Portuguese East Africa; length, 340 miles; breadth, 40 miles; greatest depth, 2315 ft.; area, 10,200 sq. miles; known to Portuguese as *Moravia* in XVII. cent.; first explored by Livingstone, 1859; navigated by steamers and sailing vessels.

NYASALAND See BRITISH CENTRAL AFRICA.

NYBORG (55° 19′ N., 10° 47′ E.), seaport, island of Fünen, Denmark, on Great Belt; formerly important fortress; Swedes defeated here, 1659. Pop. 8,300.

NYE, EDGAR WILLIAM (1850-1896), an American humorist, *b.* at Shirley, Me. He wrote under the name of Bill Nye, and was one of the most versatile and productive American humorists. His humorous writings appeared in newspapers for many years and he published many books. He was also well known as a lecturer.

NYEZHIN (51° 8′ N., 32° E.), town, on Oster, Chernigov, Russia. Pop. 49,000.

NYIREGYHAZA (47° 58′ N., 21° 40′ E.), town, Hungary; extensive vineyards in vicinity. Pop. 41,112.

NYKJÖBING (54° 46′ N., 11° 52′ E.), seaport, on island of Falster, Denmark. Pop. 7,800.

NYKOPING (58° 45′ N., 17° 1′ E.), seaport, Södermanland, Sweden, on Baltic; steam engines, cloth. Pop. 1921, 11,710.

NYLSTROOM (24° 42′ S., 28° 33′ E.), town, on Nylstroom, Transvaal; gold deposits.

NYMPHAEACEAE, order of aquatic plants with large floating leaves; examples are Lotus, Water-Lily.

NYMPHS (classical myth.), minor goddesses of nature; associated with streams, mountains, etc.; principal divisions were *Nereïds* (sea n's), *Aesëides* (grove n's), *Dryades* (forest n's), *Orcades* (mountain n's); frequently confused with ancient Ital. local deities of wood and stream.

O

O, 15th letter of alphabet; appears in Egyptian hieroglyphics; in classical Greek represented by O (*omicron*=small *o*) and N (*omega*=great *o*), which are short and long respectively. In English *o* has several sounds=ŏ (as in *not*), ō (*note, for*), o͝o (*love*), oo (*Scone*).

OAHU, see HAWAIIAN ISLANDS.

OAJACA, see OAXACA.

OAK (Quercus), a dicotyledonous genus of trees included in the Cupuliferæ; widely distributed; stem stout and covered with rugged bark; leaves oval, with bluntly sinuate or serrate margins. The male flowers are borne in lax, pendulous inflorescences; female flowers borne in axils of upper leaves, and each surrounded by a cupule, which is usually regarded as having arisen by fusion of the bracteoles. The fruit, or *acorn*, is at first completely enclosed by the cupule, but when mature is only protected by it basally.

OAKLAND, a city of California, in Alameda co., of which it is the county seat. It is on the Southern Pacific, the Western Pacific and other railroads, and on San Francisco Bay, 7 miles east of San Francisco. The city is well laid out and is a favorite residential place. It is the chief trade center of a large fruit growing region. Its industries include the manufacture of flour, pottery, brass goods, leather, and it has canning factories, shipbuilding yards, and metallurgical works. It is the seat of St. Mary's College and other educational institutions. The public buildings include a handsome theatre, municipal buildings, auditorium and several hospitals. There are many beautiful parks. Pop. 1920, 216,361.

OAKLEY, VIOLET (1874), Mural painter. Pupil at Art Student's League, New York and Pennsylvania Academy of Fine Arts, also studied in France. Painted the Mural decorations in the governor's reception room at State Capital, Pennsylvania and nine panels in senate chamber. Designed stained glass windows at the church of All Angels, New York and panel in Cuyahoga County Court House, Cleveland. Awarded the medal of honor at the San Francisco Exposition in 1915, gold medal of honor, Pennsylvania Academy of Fine Arts, 1905, gold medal, Architectural League of New York, 1916.

OAK PARK, a city of Illinois, 9 miles west of Chicago, of which it is residential suburb. It is on the Chicago and Northwestern railroad. It is the seat of the Scoville Institute and has other important public buildings. Pop., 1920, 39,830.

OAMARU (45° 6′ S., 171° 1′ E.); town, S. Ireland, New Zealand; exports grain, frozen meat. Pop., 5,300.

OARS differ in that they are passed through thongs or rowlocks; used as auxiliary to sails or as sole mode of propulsion in classical and mediæval times. Ancient battleships generally possessed three banks of oars or even more; sometimes 40 feet long; replaced by sails, XV. cent., largely owing to introduction of artillery. Wooden thole-pins to secure leverage for oars were replaced by iron rowlocks. Oars are made in various shapes, generally lighter for fresh-water rowing.

OASIS, fertile part in a desert, due to springs, *e.g.* Sahara O.; or artificial artesian wells, *e.g.* in Algeria.

OATES, TITUS (1649-1705), spread abroad tale of Catholic plot to murder Charles II. and massacre Protestants, 1678. O. was pensioned; Catholics executed and queen implicated. On James II.'s accession he was sentenced to flogging and life-imprisonment; released, 1688, and led disreputable life till end.

OATH, solemn declaration invoking the witness of God that the truth shall be spoken. The general legal rule is that evidence in a court of law is not admissible unless it is given on o., or by some form of *affirmation* which the law regards as equivalent to an o. Should a person object to taking the o. on the ground that he has no religious belief, or that the taking of an o. is contrary to his religious belief, he may make a solemn affirmation which has in law

the same effect as an o. No particular form of the o. is compulsory. The witness may adopt any form which is binding on his conscience or employ any ceremonies required by his religion. Those professing Christianity usually hold a copy of the New Testament or of the Gospels in the naked right hand, while the following o. is read aloud by the officer of the court: 'The evidence which you shall give between the parties shall be the truth, the whole truth, and nothing but the truth, so help you God.' The old custom of kissing the book has now been abolished. Jews are sworn on the Pentateuch with heads covered; Muhammadans on the Koran.

OATS (*Avena sativa*) a gramineous plant much cultivated in the United States and N. Europe generally for food, being harder than wheat. The inflorescence is paniculate, with two to six flowered spikelets. O. form an invaluable food for horses, and yield the well-known oatmeal.

OAXACA, OAJACA (1) (17° N., 96° 30′ W.), state, S. Mexico; area, 35,382 sq. miles; surface generally mountainous; produces cereals, rubber, coffee, sugar, etc. Pop., 1,060,000. (2) town, capital of above, on Rio Verde; sugar, cochineal. Pop., 39,000.

OB, OBI (66° 30′ N., 67° E.), navigable river, W. Siberia, flowing into Gulf of Ob.

OBADIAH, Old Testament book and one of minor prophets. The writer speaks mostly of Edom, and prophesies their destruction at an impending 'day of the Lord,' when they and other nations shall be requited according to their works. The destruction of Jerusalem referred to is that probably of 586 B. C. There are close parallels between O. and *Jeremiah* 49[7-22], and probably both drew from a common source.

OBAN (56° 24′ N., 5° 27′ W.), town, Argyllshire, Scotland; noted summer resort and yachting center; stands on beautiful bay. Pop., 1921, 6,129.

OBELISK, four-sided tapering stone monument, especially common in Egypt; placed in front of gateways of temples and halls or in isolated positions; sides generally covered with hieroglyphics; good examples, the Obelisk in Central Park, New York, and Cleopatra's Needle, in London.

OBENCHAIN, ELIZA CALVERT (Eliza Calvert Hall) (1856), author; *b.* at Bowling Green, Kentucky. Educated at private schools. Since 1889 identified with woman suffrage. Author of: *Aunt Jane of Kentucky, 1907*; *The Land of Long Ago, 1909*; *Sally Ann's Experience, 1910*; *To Love and To Cherish, 1911*; *A Book of Hand-Woven Coverlets, 1912*; *Clover and Blue-Grass, 1916.* Wrote for magazines.

OBER, FREDERICK ALBION (1849-1913), an American ornithologist and writer; *b.* in Beverly, Mass. Following a personal interest in birds, he traveled extensively in the West Indies, South America, Africa and other tropical countries, collecting specimens, and adding 22 to the known number of species or varieties of birds. He wrote *Camps in the Caribees, 1880*; *Porto Rico, 1898*; *A History of the West Indies, 1900*; *The Last of the Arrawaks, 1901*, and *A Guide to the West Indies and the Bermudas, 1908.*

OBERAMMERGAU (47° 35′ N.; 11° 4′ E.), village, on Ammer, Bavaria; wood and ivory carving. Noted Passion Play has been performed here every ten years, since passing of plague, 1634. The last presentation was in 1922.

OBERHAUSEN (51° 30′ N.; 6° 50′ W.), town, Rhine province, Prussia; ironworks. Pop., 1920, 98,677.

OBERHOLTZER, ELLIS PAXTON (1868), author; *b.* at Philadelphia, Pennsylvania. Educated at University of Pennsylvania and German universities. In newspaper work and wrote for magazines for several years. Author of: *The Referendum in America, 1893*; *Die Beziehungen Vwischen dem Staat und der Veitungspresse, 1895*; *The New Man, 1897*; *The Referendum in America, 1909*, revised edition in *1911*; *Robert Morris, Patriot and Financier, 1903*; *Abraham Lincoln, 1904*; *The Literary History of Philadelphia, 1907*; *Jay Cooke, the Financier of the Civil War*, 2 volumes, *1907*; *Henry Clay* (with Thomas H. Clay), *1909*; *Philadelphia, the City and Its People*, 2 volumes, *1911*; *A History of the United States since the Civil War*, Volume 1, *1917*; Volume 2, 1921; *The Menace of the Movies, 1922.*

OBERLIN, a city of Ohio, in Lorain co. It is on the Lake Shore and Michigan Southern railroad. It is notable for being the seat of Oberlin College. It has besides a business college, a school of telegraphy, and a conservatory of music. Pop., 1920, 5,000.

OBERLIN COLLEGE, a co-educational, non-sectarian institution, founded in 1873, in Oberlin, Ohio. Its productive funds amount to over $2,800,000, its yearly income being about $142,000. Its departments include a conservatory of music. The library contains over 221.-

000 volumes. In the 1921-2 session it had a student enrollment of 1,607, the members of the faculty numbering 129.

OBERON, king of the fairies and husband of Titania; familiar figure in mediæval tales; appears in *A Midsummer Night's Dream* and in Weber's opera *Oberon, 1826,* words by Wieland.

OBITER DICTUM (Lat. 'said by the way'), an expression used specially to denote those judicial utterances and decisions in the course of delivering a judgment which, taken by themselves, were not strictly necessary for the decision of the particular issues raised. In the language of jurisprudence an O. D. is of 'persuasive' and not 'authoratative' efficacy, when cited by a counsel in support of an argument.

OBJECT GLASS, large glass at end of a refracting telescope at opposite end to eyepiece. The o. g. receives the rays of light from a star or other object, and collects them to a focus, where is placed the eyepiece, which magnifies the image there formed. A telescope's quality and power depend on its o. g. The modern o. g. consists of two pieces, an outer convex lens of crown glass and an inner concave lens of flint glass, this combination greatly reducing the effects of chromatic aberration.

OBJECTIVISM, theory that we can attain real truth, through objective validity of our ideas.

OBLIGATION, a term used in jurisprudence (*q.v.*) to denote the binding force of a legal contract.

OBOE, HAUTBOY, important woodwind instrument played by a double reed; evolved from primitive *schalmei,* now obsolete, and in its present form about 200 years old; has a peculiar nasal tone, piercing, yet expressive. Essentially a lyric instrument, music of a tender, pastoral character suits it best, but in skilful hands it is also useful for the expression of melancholy and gaiety.

OBOK (12° N., 43° 30′ E.), decayed seaport, on Tajura Bay, Fr. Somaliland.

OBOLUS (Gk. *obolós* 'a spit'), the smallest Greek coin and also the smallest Greek weight in common use. As a coin it was always equivalent to one-sixth part of a drachma, and was therefore worth about 1·625*d.*, though the amount varied. As a weight it was again equal to one-sixth of a drachma, that is, to about 16 grains, although it fell to as low as 8·6 grains during the later Roman empire.

OBREGON, ALVARO (1880), Mexican soldier; *b.* in District of Alamos, State of Sonora, in 1880. Of a wealthy family, he engaged in scientific farming and stock-raising on his estates. He was a reformer and wanted the peasants and Indians to be educated and share in the land. In 1912 he began his military career by recuiting 400 or 500 Indians for Madero, whom he helped to crush the revolt of Pascual Orozco. Obregon's force fought so well they were named 'invincibles'. Friends and citizens of Sonora flocked to him, and he returned home with a force of 4,000 men. He was appointed colonel of the Sonora State Militia, and after the Diaz military revolt in Mexico City, Obregon offered his force of Indians to the Governor of Sonora, and was sent to Nogales where he routed the garrison. He won a battle at Cananea and was made general of division of the Army of the West by Governor Carranza of Coahuila. After many victories he took Guadalajara July 9, 1914 and entered Mexico City in August, 1914. He defeated Zapata at Pueblo in January 1915, re-occupied Mexico City again, and evacuated it in March. He defeated Villa at Celaya in April, and at Leon, May 31-June 4. In one of these battles he lost an arm. In 1920 he headed a successful revolution against President Carranza, and in December of the same year was elected President of the Republic. See MEXICO.

O'BRIEN, FREDERICK, an American writer; *b.* in Baltimore, Md. He was educated in the Jesuit College, of Baltimore, and the University of Maryland, and at the age of eighteen went to sea. At various times he has been correspondent for American newspapers. For a while he served as acting food administrator for the State of California. He is the author of *White Shadows in the South Seas, 1919,* and *The Mystic Isles of the South Seas, 1921.*

O'BRIEN, FITZ-JAMES (1828-1862), an Irish-American author and poet; *b.* in Limrick, Ireland. He was graduated from Dublin University, entered journalism and came to the United States in 1852, where he contributed articles to the Harper publications. He wrote two very remarkable short stories, *The Diamond Lens,* and *The Wondersmith,* which were published in the Atlantic Monthly. His play, *A Gentleman from Ireland,* was popular for over a generation. During the Civil War he enlisted and was killed in action. His collected works were edited by William Winter and published in 1881.

O'BRIEN, SEUMAS (1880), a sculptor and writer; *b.* at Glenbrook, County Cork, Ireland; *s.* of John J. and Eliza-

beth Harding Aherne O'Brien. He was educated at Presentation Brother's School, Cork, Cork School of Art, Cork School of Music, Met. School of Art (Dublin) and at the Royal College of Art, London. He was an instructor in art until 1912 and exhibited at the Royal Hibernian Academy, and came to the United States in 1913. Author: *Duty and Other Irish Comedies, 1916*; *The Whale and the Grasshopper, 1916*, and *Blind, 1918*; also the plays *Duty*; *Matchmakers*; '67'; *Failure of Triumph*; *Blind* and *The Cobbler's Den.*

O'BRIEN, WILLIAM (1852), Irish journalist and politician; founded *United Ireland, 1880*, as the organ of the Land League; formed the United Irish League 1898, and after 1910 became the leader of a group of Independent Nationalists; has pub. *When we were Boys, 1890*; *Irish Ideas, 1894*; *A Queen of Men, 1897*; *Recollections, 1906*, and *An Olive Branch in Ireland and Its History, 1910.*

OBSERVATORY, an establishment for observing the heavenly bodies, as well as magnetic and meteorological phenomena. The first known observatory was founded at Alexandria in 300 B. C. Up to the XV. cent. mediæval methods held sway, and little was done in Europe till the erection of observatories at Nuremburg by Walther, 1472, and at Hveen by Tycho Brahe, 1576. The modern epoch began with the erection of observatories at Paris, 1667, and Greenwich, 1675. Royal Observatories are established at Greenwich, Edinburgh, and Dublin, and also at Cape Town. During the XVIII. and XIX. cents. many other observatories came into being, especially in America during the latter part of the XIX. cent.

An observatory consists chiefly of the dome or cupola for housing the telescope. This dome rests on a substructure, and generally runs on roller bearings. A sliding shutter is so arranged that it gives an opening allowing the telescope to be pointed from horizon to zenith. This opening may be directed to any point of the sky by rotating the cupola. Telescopes are generally mounted equatorially; by clockwork the instrument automatically follows a celestial object from its rising to its setting. In observatories where very large instruments are used, rising floors, worked by hydraulic power, are installed to accommodate the observer to the alteration in the instrument's height. A transit instrument and sidereal clock are also necessary for the carrying on of astronomical work. The former is so arranged as to move only up and down, like a cannon. It points due south, and is generally accommodated in a separate building or room. The time a star crosses the line of the transit instrument is taken, and compared with the star's known time of transit, and the sidereal clock is regulated thereby. The clock, a very evenly balanced instrument, involving the highest art of clockmaking, is used in connection with the locating of heavenly bodies.

Owing to the impurities of the atmosphere, caused by factory chimneys, etc., it has been found advisable to build observatories on the summit of mountains. California, U. S., is specially noted for its clear atmosphere. Perhaps the most famous observatory of the present day is the Lick.

OBSIDIAN, volcanic rock (vitreous lava) of acid composition and of glassy appearance; composition resembles granite, and it is classed with felspars; found in Europe, Iceland, Siberia, S. America, Mexico, Peru; hard and brittle; sometimes used for ornamental purposes. Incas and Yucatans of Peru and Mexico used o. for weapons, spear- and arrow-heads, cutting knives, etc.

OBSTETRICS, or **MIDWIFERY,** is the science which deals with the case of a pregnant woman, the bringing of her child into the world, and the care of the woman and the newborn child in the puerperium, or lying-in period immediately following labor, in which the organs of generation of the woman return to their non-pregnant condition. The most distinctive part of the science of obstetrics is the process of labor, which takes place in three stages; first, the dilatation of the uterus to allow the escape of the child; second, the expulsion of the child; and third, the expulsion of the *placenta*, or after-birth. A natural labor is one in which the head of the child is presented, and which begins and ends within the space of twenty-four hours.

Pregnancy extends for nine calendar months, and the date of confinment may be reckoned as falling within the fortnight which has as its central date the 280th day after the beginning of the last menstrual period. The earliest sign of pregnancy is the cessation of the monthly menstrual flow. During the second, third, and fourth months a certain amount of sickness is experienced, most commonly on rising. From the third month the breasts become enlarged and the superficial veins more prominent; there is a feeling of fullness, associated at times with pain. The pink areola surrounding the nipple becomes darker and wider. The glands surrounding the nipple become enlarged and form

prominent papillæ. After the fourth month the abdomen enlarges. Quickening, the first indication of an independent life, is due to the movements of the child, and is usually experienced during the fifth month.

While most pregnancies are normal, there are complications which may appear. The morning sickness may become excessive; but it yields to treatment. Sleeplessness should be carefully treated. Attention to diet, especially in the evening, may be all that is required. Owing to the pressure of the uterus, there is a special tendency to varicose veins and swelling of the legs. Rest in bed, with bandages if necessary to the affected parts, is all that is needed. Jaundice occasionally occurs. There may be a discharge from the vagina which causes itching and is accompanied by pains in the back; antiseptic and astringent douches will remedy it.

Eclampsia (convulsions closely resembling those of epilepsy) is fortunately of rare occurrence.

OCANA (39° 56′ N., 3° 29′ W.), town, Toledo, Spain. Pop., 7,200.

OCCASIONALISM, doctrine that mind and matter do not interact, and that on any change in one, God intervenes to produce a change in the other. See DESCARTES.

OCCIDENT, the western quarter of the hemisphere, used in contra-distinction to Orient.

OCCLEVE, THOMAS, HOCCLEVE (1368-*c.* 1450), Eng. minor poet of Chaucerian school. His longest work is *The Regement of Princes*, or *De Regimine Principum*, a metrical homily on conduct. He also wrote *Jereslaus' Wife*, *Jonathas*, and *Learn to Die*.

OCCULTATION usually refers to the concealment of a star by the moon, which, by its eastward motion, eclipses the star. The star disappears behind the eastern limb and reappears at the western. In the first half of the lunation, the E. limb being dark and the star a mere point, the O. is sudden, forming a most accurate means of determining the moon's position, and thus its perturbations, the Greenwich time being known, the longitude of a place is thus accurately determined. The phenomenon is confined to a belt of 10° 17½′ wide in the heavens. The O. of its moons by Jupiter may also be used to determine longitude. *Circle of perpetual occultation* is a small circle of the sphere described round the depressed pole, with a radius equal to the depression; the *circle of perpetual apparition* being equal and opposite.

OCCUPATIONAL DISEASES. Diseases due to the occupation of the sufferer are of very common occurrence, and are of great variety. Many of them are trivial, some are serious and, if neglected, may end in death. There is scarcely an occupation which does not have its attendant disease, and the parts affected represent almost every organ of the body. Various methods of classifying the diseases have been used. One of the most logical depends on the conditions giving rise to the trouble. Under this arrangment, the diseases are divided as follows: (1) Those due to toxic substances, solid, liquid or gaseous. (2) Those due to the mechanical irritants, such as dust. (3) Those due to conditions of temperature or air pressure. (4) Those due to over-use or straining of muscles or nerves. The first class includes a variety of poisons encountered in many chemical and metallurgical industries. In the manufacture of white lead, finely powdered lead compounds may be inhaled by the workers, leading to 'wrist drop', partial paralysis and other symtoms of lead poisoning. Employees in some match factories are liable to develop 'phossy jaw', while workers in bleach and chlorine plants, and other chemical factories, are subject to diseases of the skin and lungs. Among the mechanical irritants may be mentioned the fine sandy dust existing in cement works, or in sand blasting. Divers, tunnel workers, and construction gangs working in caissons are subject to disorders of the blood and nervous systems, while railroad workers, fishermen and others who are compelled to work out of doors under unfavorable weather conditions are frequent victims to rheumatism, tuberculosis and other diseases due to exposure. Straining of muscles and nerves occurs in many different occupations. Longshoremen, blacksmiths and porters are liable to develop rupture, aneurism and similar disorders. Boiler makers are frequently deaf, glass blowers and band players are subject to diseases of the lungs, while police, waiters and others whose occupation entails much standing frequently suffer from flat feet or varicose veins.

OCEAN. The Ocean is the mass of continuous water covering 72 per cent. or nearly three-fourths of the earth's surface; partially enclosed or shallow areas are sometimes known as seas. The area has been computed at 142,000,000 sq. m.; average depth, 11,500 ft. (some 2¼ m.); volume, 300,000,000 cub. m.

Distribution — In the northern hemisphere the proportion of land to water is 2:3; in the southern, 1:4·7. There is a 'land hemisphere,' however, in which

they are nearly equally distributed, and a water hemisphere in which the water covers an area ten times that of land. On either side of lat. 60° S. there is a continuous belt of Ocean surrounding Antarctica from which the great oceans extend northwards; the Indian Ocean is a semi-circular sweep beyond the equator, terminated by the S. mountain masses of Asia; the Atlantic is a great S curve to the Artic Circle where the Artic Ocean forms an embayed end, occupying a polar 'cap' of radius 20°; the Pacific, a roughly circular area some 170° in breadth at the equator and terminating at the Artic Circle. The forms of the ocean areas roughly agree with the tetrahedral theory See OCEANOGRAPHY.

OCEAN GROVE, a city of New Jersey, in Monmouth co. It is on the Pennsylvania and the Central of New Jersey railroads, and on the Atlantic Ocean. It adjoins Asbury Park on the south and is a favorite summer resort. Here is held the annual camp meeting under the auspices of the Methodist Episcopal Church and Ocean Grove is controlled largely by the camp meeting association. There are many important buildings, an auditorium, post office and school. The permanent population is 2,500 which is increased in the summer months to 25,000.

OCEANIA, OCEANICA (35° N. to 55° S., 100° W. to 130′ E.), division of globe comprising islands in Pacific Ocean; divided into various groups, viz. Melanesia (with Australasia), Polynesia, Malaysia (excluded by some geographers), and Micronesia. These islands are divided among Britain, U. S. A., Holland, France, Japan, and Chile, and are involved in the important problem of the mastery of the Pacific.

OCEANOGRAPHY, the comprehensive science which deals with the ocean in all its aspects—its tides and currents, its varying composition and temperatures, its vegetation, and its animal inhabitants. Apart from its purely scientific aspect, oceanography is of immense importance to navigators, and especially to fishermen; for on a knowledge of the habits of fishes, which in turn depend in great part on oceanic conditions, the progressive and scientific advance of fisheries depends.

Oceanography cannot be called a single or pure science, for it includes many branches and takes toll of many sciences. Physics measures and interprets tides and currents, chem. tells of the composition of sea water and its content, bot. and zool. are laid in tribute; but oceanography has a distinct function in correlating and uniting the isolated items of information into a single compact science of the sea. Owing to the difficulty of observing directly any but the surface layers of the ocean, the progress of oceanography has been very gradual until recent years, and has kept step only with the perfecting of instruments for making records in the unseen depths.

The early observers were content with measuring the depth of the ocean—from Magellan, who, in 1521, on the first voyage round the world, failed to reach the bottom of the Pacific with a 200-fathom line, to Sir John Ross, who, in 1817-18, touched the bottom of the Arctic Ocean in 1,050 fathoms and brought up on his sounding-line a live starfish—a hint that even at great depths living things existed.

Sporadic observations of ocean phenomena have been made since the earliest times, but the main development of knowledge has lain with expeditions specially fitted for the purpose. Thus Edmund, in 1699, and Halley, the astronomer-royal, endeavored to gain information concerning longitude and the variation of the compass, whilst among many more purely oceanographical expeditions stand out pre-eminently those of Captain James Cook in 1772-3, the Antarctic expeditions of Sir James Clark Ross from 1839 to 1843, the U. S. Exploring Expedition of Captain Wilkes and Professor Dana from 1839 to 1842, the U. S. Coast Survey from 1844, with which Maury, Pourtalés, and Louis Agassiz were associated, and the N. Atlantic cruises of *Lightning*, 1868, and *Porcupine*, 1869, under the leadership of Sir Wyville Thomson and W. B. Carpenter. But overshadowing all others in the comprehensiveness and scientific value of its work was the great expedition of H. M. S. *Challenger*, under Sir Wyville Thomson, which from 1872 to 1876 circumnavigated the world, crossing and recrossing the great oceans, observing and collecting everywhere. The magnitude of its labors may be judged from the fact that the scientific results (ed. by Sir John Maury) were published in 50 quarto vols., and these form the bedrock upon which modern oceanography has been founded.

Since the *Challenger* voyage scarcely a year has past without the accomplishment of important scientific work by one expedition after another. Researches have concentrated more particularly in the N. Atlantic, in the North Sea, and in the Antarctic Ocean. Outstanding efforts have been made in the first by the Prince of Monaco on his yachts *L' Hirondelle* and *Princesse Alice*; in the second by the International Commission for the

Scientific Investigation of the North Sea, participated in by Great Britain, Sweden and Norway, Russia, Germany, Denmark, Holland and Belgium; and in the last by a series of well-equipped expeditions dispatched to the Antarctic by Belgium, 1897-9; Great Britain, (Scott), 1901-3 and 1911-13; Bruce, 1902-4; Shackleton, 1907-9 and 1914-16; Australia, (Mawson), 1911-13; Germany, 1901-3 and 1911; Sweden, 1901-3; and France, 1903-5 and 1908-10. Great improvements in the physical apparatus employed, and in the methods for the collection of biological material. The non-magnetic ship *Carnegie*, under M. Christian of the Carnegie Institution has made many voyages since 1909, and has explored and mapped a large area of ocean surface.

It is impossible to describe all the complicated apparatus used in vessels fitted for oceanographical research, but mention may be made of the automatic sounding machines, such as that invented by Lucas, which records mechanically the depth at which bottom has been touched; of reversing thermometers, which from the deck can be made to register the temp. at given depths, and with which is associated a water-bottle which brings to the surface a sample of water from the same depth for examination as to salinity, etc.; current meters, which, lowered and kept as stationary as possible at a definite position, record the direction and speed of tidal and other currents; *bathometers*, by which a fairly accurate determination of the depth of water under a ship on the deep sea may be made; and the apparatus for collecting the organic content of the sea. This last consists of dredges to be dragged along the bottom, and of many types of net: the otter-trawl, and pelagic trawls for catching the larger animals—the former at the sea bottom and the latter at any desired depth; vertical nets drawn directly upwards, so that the content of a column of sea water of known length and area can be estimated; and tow nets, several of which, at the surface and known depths, are generally employed at one time. The nature of the bottom deposit is ascertained by sounding tubes which penetrate several inches into the ocean floor.

The result of innumerable sounding observations has been to show that the bottom of the ocean more or less resembles the surface of the land: in places marked by deep depressions, which, as in the greatest abyss known—the Swire Deep off Mindanao, one of the Philippines—may reach a depth of 5,348 fathoms, or 409 ft. more than six Eng. miles; or rising here and there in great elevations which sometimes reach the surface and project as islands, but more frequently form great submarine ridges far underneath the surface, such as the Mid-Atlantic ridge, which runs down the center of the Atlantic Ocean from the Arctic Ocean to the latitude of Cape Horn. But the sea-bottom is more uniform than the surface of the land. The average depth of the ocean is about two miles, more than half (58 per cent.) of its entire floor being covered by depths between 2,000 and 3,000 fathoms. Vegetation, as we know it on the sea-shore, almost ceases at a depth of 10 to 15 fathoms.

Round the continental areas, and extending from the shore to varying distances, down sometimes to 1,000 or rarely to 2,000 fathoms below sea-level, are deposits formed mainly from the neighboring land—coral sands and muds, green, red, and blue muds, and volcanic sands and muds. In deeper water the deposits are even more uniform, extending sometimes over many thousands of square miles. There they are formed of the skeletons of minute organisms which have sunk to the bottom, and after which they are named. In the shallower waters far from land the sea-floor is covered with Pteropod ooze, formed of the empty shells of the pelagic molluscs Pteropods. Characteristic of depths between 1,000 and 2,000 fathoms, the commonest deposit, found over hundreds of thousands of square miles, is Globigerina ooze formed of foraminiferal shells; still deeper in colder regions are Diatom oozes of microscopical plant skeletons, and in the tropical Pacific and Indian Oceans Radiolarian oozes, while in the abysses there occurs a red clay derived mainly from volcanic products.

However uniform the sea-floor may be, the ocean itself presents great variety, and its depths, tides, currents, varying temperatures, and varying salinities are more or less reflected in the organisms which live in it. The inhabitants of coastal waters are mainly brightly and variously colored, and are furnished with comparatively heavy bodies and strongly developed protective devices. In the open sea blue colors are prevalent. and the bodies of many pelagic creatures are delicate, transparent, and almost invisible, with adaptations to a floating habit. With increasing depths, colors become more uniform, dark browns, blues, violet, and black being commonest amongst fishes, and reds amongst invertebrate animals, at and beyond 300-400 fathoms, at which depth most of the suns' rays are absorbed. Other interesting develop-

ments appear to be due to phenomena of light, for while all the sun's rays penetrate to 55 fathoms, and light is still strong at 275 fathoms, and can be detected even at 550 fathoms, no trace of sunlight affects photographic plates in 930 fathoms. In those depths many invertebrates and fishes are furnished with luminous organs, eyes become larger, to catch every faint gleam of light, or disappear altogether in the darkness, and tactile organs or feelers take their place or act as subsidiaries. Pressure increases at the rate of one atmosphere for every 5½ fathoms, which represents a pressure of about 2½ tons per square inch at a depth of 2,000 fathoms, and to withstand this the bones and flesh of deep-sea animals are soft and porous. Many bottom animals too are furnished with long legs and long stalks to raise them above the suffocating ooze on the sea-floor.

The study of ocean currents and drifts in the Atlantic and North Sea has shown that upon them depends the distribution of the minute organisms which constitute the food of many fishes, and therefore to a great extent the distribution and migration of fishes themselves.

To the investigations of oceanographers mariners owe their invaluable charts of soundings and their knowledge of tides, oceanic currents, and drifts, information which also places in the hands of the meteorologist the key to many of the climatic conditions and fluctuations on sea and land. Further, although as regards fisheries it is only in recent years that efforts have been made to interpret the complicated phenomena in terms of physical oceanography, yet already many problems seem on the verge of solution.

OCELOT, see under CAT FAMILY.

OCHAKOV, OTCHAKOV (46° 40′ N., 31° 30′ E.), fortified seaport, Kherson, Russia, on Black Sea; taken by Russians, 1737 and 1788; fisheries. Pop., 11,500.

OCHINO, BERNARDINO (1487-1564), Ital. theologian; confessor of Pope Paul III. and general of Capucin order; wonderful powers as preacher; charged with heresy, and fled to Geneva, 1542; subsequent life as fugitive and heretical preacher and writer.

OCHRE, the name given to several varieties of native earths, which consist of a mixture of hydrated oxide of iron, with silica and alumina. They range in color from light yellow to brown. The incrustation of oxides of other metals, antimony, bismuth, nickel, etc., are also called Os., though they are not so important. Red and yellow Os. are prepared by grinding and washing, and are extensively used as pigments. O. is found in several parts of England, notably in Anglesey and Devonshire; also in Canada, etc.

OCHRIDA (41° 11′ N., 20° 43′ E.); town, Albania, on Lake Ochrida. Pop., *c.* 17,000.

OCHS, ADOLPH S. (1858), an American newspaper publisher; *b.* at Cincinnati; *s.* of Julius and Bertha Levy Ochs. He received a common school education at Knoxville, Tenn. After being a newsboy and printer's apprentice at Knoxville, Tenn., from 1869-73, and newspaper compositor from then until 1877 he became the publisher of the Chattanooga Times in 1878 in conjunction with which he was also the publisher and principal owner of the New York Times from 1896. He was also a director of the Associated Press.

OCHTMAN, LEONARD (1854), an artist; *b.* at Zonnemaire, Zeeland, Holland; *s.* of John and Hendricka Fonteine Ochtman. In 1866 he settled with his family in Albany, N. Y., where he was employed as a draughtsman in an engraving office, and later took the winter course at the Art Students' League, New York. He was a regular exhibitor at the National Academy of Design and various art societies and received many medals and awards.

OCMULGEE RIVER, a stream rising in the north-central part of the state of Georgia, flows south, southeast and east for 260 miles, finally joining the Oconee to form the Altamaha River. Small steamboats are able to navigate about half its length, up to Macon.

OCONEE, a river in Georgia which unites with the Ocmulgee to form the Altamaha. It is navigable for about 100 miles.

O'CONNELL, DANIEL (1775-1847); Irish statesman; famous barrister, nicknamed 'the counsellor'; became head of anti-Union party; formed Catholic Association, 1823, of great power, dissolved, 1825, to anticipate suppression; established society, 'Friends of Ireland,' 1829, and various successors, in their turn suppressed; M. P. for Dublin, 1832, and fought Coercion Act of 1833; introduced subject of Repeal, 1834; founded Repeal Association, 1840; imprisoned for conspiracy to raise sedition, 1844; opposed to militancy, and broke with young Irish party; revered in Ireland as *the Liberator.*

O'CONNELL, DENNIS JOSEPH, an American Roman Catholic prelate; *b.*

in Charleston, S. C. He was educated at St. Charles' Seminary and St. Mary's College, in his native city, and ordained a priest in 1877, soon after becoming secretary to Cardinal Gibbons. He has been successively head of the American College in Rome, rector of the Catholic University of America and in 1909 was consecrated auxilliary bishop of San Francisco. In 1912 he was appointed Bishop of Richmond, Va., and in 1907 he became a Cardinal.

O'CONNELL, WILLIAM HENRY (1859), an American Roman Catholic prelate; *b.* in Lowell, Mass. Graduating from Boston College, in 1881, he pursued his theological studies in Rome, being ordained a priest in 1884. In 1895 he was appointed rector of the North American College in Rome, named domestic prelate two years later and in 1901 appointed Bishop of Portland, Me. He was named assistant at the Pontifical Throne, in 1905, and later in the same year was sent to the Japanese Court as papal envoy. He succeeded to the See of Boston on the death of Archbishop Williams, in 1907, and in 1911 became a Cardinal.

O'CONNOR, JOHN JOSEPH (1855), a bishop; *b.* at Newark, N. J.; *s.* of Thomas and Catherine Farrell O'Connor. He was educated at Seton Hall College and also at the American College, Rome and at the University of Louvain, Belgium. After being ordained a Roman Catholic priest in 1877, he was professor of theology and philosophy at Seton Hall College and Seminary from 1878-95 and then pastor of St. Joseph's, Newark, N. J., until 1901 when he was consecrated bishop of Newark, N. J.

O'CONNOR, THOMAS POWER (1848), Irish politician and journalist; founded and was editor of the *Star*, the *Sun*, the *Weekly Sun*, *M. A. P.*, *T. P.'s Weekly*, and *P. T. O.*, all brilliant successes; author of *Lord Beaconsfield: a Biography*, *1879*; 2nd ed. *1884*; *Gladstone's House of Commons*, *1885*; *The Parnell Movement*, *1886*; *Some Old Love Stories*, *1895*; *Napoleon*, *1896*; *In the Days of My Youth*, *1900*; and *The Phantom Millions*.

O'CONOR, CHARLES (1804-1884), an American lawyer; *b.* in New York. He studied law and began to practice in New York, quickly gained recognition as one of the best legal minds of his time, making his reputation as one of the prosecuting attorneys against 'Boss' Tweed of Tammany Hall. In 1872 he was nominated as the Presidential candidate of the anti-Greely democrats, but this honor he declined. He wrote *Peculation Triumphant*, a book on the Tweed ring in politics.

O'CONOR, JOHN FRANCIS XAVIER (1852), educator; *b.* in New York. 1872 graduated from St. Francis Xavier College and the same year became a member of the Society of Jesus. Ordained 1885, a Roman Catholic priest. Was professor at Georgetown University, Boston College and West Park College. Was professor of philosophy in Fordham University, St. Jospeh's College and St. Francis Xavier College. First president and founder of Brooklyn College. Author of: *Lyric and Dramatic Poetry*, *1883*; *Babylonian Inscriptions of Nebuchadnezzar*, *1885*; *Garucci's Christian Art*, *1885*; *Three Holy Lives*, *1888*; *Pearls of a Year*, *1889*; *Practise of Humility*, *1890*; *Life of St. Aloysius*, *1892*; *Jesuit Missions in America*, *1892*; *Reading and the Mind*, *1897*; *Sacred Scenes and Mysteries*, *1898*; *Facts About Bookworms*, *1898*; *Rhetoric and Oratory*, *1898*; *Christ the Man God*, *1900*; *Autobiography of St. Ignatius*, *1900*; *Education in the Schools of New York*, *1901*; *Dante*, a drama, *Study of Francis Thompson's Hound of Heaven*, *1913*; *Everysoul*, mystery play and musical drama, operetta, *1913*; *Crusade of Children*, drama, *1916*; *Mystery of Life*, operetta, *1916*; *Songs of the Soul*, *1916*.

OCRICULUM, ancient town, Umbria, Italy, on Via Flaminia.

OCTAGON, in geometry, a figure of eight sides and angles. See GEOMETRY.

OCTAVE, in music. The interval of an octave—the most perfect consonance in music—is produced when the higher of two sounds contains double the number of vibrations of the lower sound. The higher sound then constitutes the first upper-partial in the harmonic series generated by the lower sound. The eighth note of a diatonic scale is always the octave of the first note. The term octave is also applied to the series of notes forming a scale—*e.g.*, an octave of the scale of C.

OCTAVIA, sister of Rom. emperor, Augustus; on her husband Marcellus' death, m. Mark Antony, only to be forsaken for Cleopatra.

OCTAVIANUS, afterwards Emperor Augustus.

OCTAVO, the size of one leaf of a sheet of paper folded so as to make eight leaves.

OCTOBER (Lat., *octo*, eight), originally the eighth month of the old Roman calendar, the year beginning in March. It retained its old name in the Julian

calendar, but then became the tenth month with 31 days. The Slavs term it yellow-month, from the falling of the leaf, and an old name for it in Germany was 'wine month.'

OCTOPUS, a genus of Cephalopoda (*q.v.*).

OCTROI (Lat. *auctoritas*), name given in France to duties levied by local authorities on certain articles (wines, foodstuffs, etc.), entering towns or communes; original meaning, royal permission to levy tax on articles of consumption entering a town; abolished, 1791, but restored, 1798; not imposed by all towns or municipal councils.

OCYDROME, a rare, flightless New Zealand bird, of dull plumage, related to the Rallidæ; interesting on account of its affinities with extinct species of Carinatæ.

ODÆNATHUS, ODENATUS (2nd half of III. cent. A. D.), prince of Palmyra; repelled Persians, who were conquering eastern provinces from Roman empire; received title of 'independent lieutenant of the Emperor of the East,' 262.

ODDE, ODDA (60° 8′ N., 6° 35′ E.), tourist center, Norway.

ODD FELLOWS, a secret, benevolent, and fraternal order organized in England about 1780 or 1790. Thomas Wildey founded the first lodge, the Washington, in the United States at Baltimore, in 1819, under an English charter and it became the Grand Lodge of America. Later the charter was surrendered and it became a subordinate of the British Grand Lodge. In 1843 it broke away from the 'Manchester Unity' which had been organized in 1814 after internal dissensions. The Grand Lodge of the Independent Order of Odd Fellows of the United States took the title as the Sovereign Grand Lodge in 1879. Subordinate lodges confer three degrees. The highest entitles membership in 'encampments'. The Rebekah degree for women was instituted in 1851. Odd Fellows lodges founded outside the United States, Canada, 1843; Hawaii, 1846; Australia, 1868; Denmark, 1878; Germany, 1870; Netherlands, 1877; Sweden, 1884; Switzerland, 1871; Cuba, 1883; Mexico, 1882, and among 22 nationalities in South America and the East. In 1884 a military degree, Patriarch Militant, was instituted. There is no incorporate heath, or life assurance, but the order has insisted on 'stated weekly and funeral benefits' as a *right*, not charity. The order maintains 6 homes in Pennsylvania, 4 in New York, 2 in Illinois, 2 in California, and in other states, and new homes are opened from time to time. Membership 2,696,582. Grand Sire, L. J. Eastin, St. Joseph, Mo.

ODDIE, TASKER LOWNDES (1870), a U. S. Senator; *b.* in Brooklyn, N. Y. He graduated from the University of the City of New York, in 1895, went into the real estate business, and in 1898 went to Nevada in the employ of Anson Phelps Stokes, to engage in mining operations. He was one of the early developers of the Tonopah mines in that state. In 1920 he was elected Republican Governor of Nevada for a term of four years, and in 1920 was elected to the U. S. Senate for the term 1921-27.

ODE, Gk. word meaning song with musical accompaniment; came to denote lyrical poetry of length and complexity, *e.g.*, the *Carmen* of Alcman, the *Horatian Ode* of Sappho, Alcæus, and Anacreon. Pindar perfected the ode. Horace's odes are more regular, and inspired such odes as Spenser's *Epithalamion*, Collins' *To Evening*, Shelley's *To a Skylark* and *To the West Wind*, Keats' *To a Nightingale*. 'Pindaric' odes are Drydens' *Alexander's Feast*, Wordsworth's *Intimations of Immortality*, Tennyson's *Duke of Wellington*.

ODELL, ARTHUR LEE (1877), an American college president; *b.* at Excelsior Springs, Mo.; *s.* of Joseph Titus and Lorena Meyer Odell. He was educated at Missouri Valley College, Marshall, Mo., and at the Union Theological Seminary. He was ordained a Presbyterian minister in 1907 and until 1918 was pastor of various churches including the King's Highway Church, St. Louis, 1911-18. He was then president of Henry Kendall College, Tulsa, Okla., until 1920, when he became pastor of the First Church, Phoenix, Ariz.

ODELL, BENJAMIN BARKER (1854), ex-governor; *b.* at Newburgh, N. Y.; *s.* of Hon. Benjamin Barker and Ophelia Bookstaver Odell. He studied at Bethany College, West Virginia and at Columbia University. After being a member of the Republican State Committee, and later chairman of the Republican State Executive Committee, he was a member of the 54th and 55th Congresses, (17th New York District), 1895-99 and declined renomination, after which he was elected governor of New York and served two terms, 1901-5. He was also engaged in banking and commercial enterprises at Newburgh and New York and was president and director of the Central-Hudson Steamboat Co.

ODENBERG, a town of Hungary, 36 miles southeast of Vienna. Prior to the World War it had manufactures of woolen, linen and cotton cloth, and sugar refineries. Pop. about 35,000.

ODENKIRCHEN (51° 10′ N., 6° 30′ E.), town, on Niers, Rhine province, Prussia; silks, velvets. Pop., 20,000.

ODENSE (55° 23′ N., 10° 22′ E.), city, island of Fünen, Denmark, on Odense; tanneries, iron foundries; cathedral contains tombs of King Canute and other kings. Pop., 1921, 49,469.

ODENWALD (49° 40′ N., 8° 48′ E.), mountainous region, Hesse, Germany; noted for its legends.

ODER (53° 20′ N., 14° 30′ E.), river, Germany; rises in Odergebirge (Moravia); flows N. W. through Germany and enters Baltic by three arms—Swine, Peene, Dievenow; chief tributaries, Bartsch, Neisse, Warthe; principal towns Breslau, Stettin, Frankfort; length, 550 miles; navigible for about 470.

ODERBERG (52° 50′ N., 14° 5′ E.), town, on Oder, Brandenburg, Prussia; dépôt for timber from Russia. Pop., 4,500.

ODESSA, tn. and port on the Black Sea, in Kherson government, Ukraine (46° 28′ N., 30° 43′ E.), 90 m. W. S. W. of Kherson city; is the fourth largest town in Russia and the second port. In ordinary winters it freezes for a few days only. The town is undermined by catacombs, which are inhabited. Among the chief buildings are the cathedral, the town hall, the city library, the museum of antiquities (containing many Græco-Scythian remains from the Crimea and Black Sea coast), the theatre, the palace, the courts of justice, and the bourse, 1899. Chief exports: flour, wheat, barley, rye, maize, oats, oilcake, sugar, pease, beans, alcohol, caviare, fish, and wood. Pop., 630,000.

Catherine II. founded Odessa by a rescript of May 24, 1794. From 1811 to 1859 it was a free port. The Fr. *émigré* noble, the Duc de Richelieu, was the first governor, 1803-14, and did much for Odessa. The town was also for a time terrorized by mutinous Black Sea Fleet. During the World War Odessa was cut off from communication with the Allied countries when Turkey closed the Dardanelles and declared war on the side of the Central Powers, Nov. 1914. After the outbreak of revolution and the disintegration of Russia the Germans advanced through the Ukraine and occupied Odessa, March 12, 1918. After the defeat of Germany it fell into the hands of Ukraine anti-Soviet forces under Petlura, Dec. 1918, and a Franco-Greek force was landed, but was compelled to re-embark before the Bolshevist advance, April 1919. It was retaken by General Deniken, but recovered by the Bolsheviks.

ODILIENBERG (48° 20′ N., 7° 10′ E.), mountain, tourist-resort, Alsace, Germany; noted Convent of St. Odile (founded VII. cent.)

ODIN, see WODIN.

ODO (1036-97), half-bro. of William I. of England; bp. of Bayeux, 1049; Earl of Kent, 1067.

ODOACER, FLAVIUS (*c.* 434-93), Ger. king (probably Scyrrian by birth), who overthrew Romulus, last Rom. emperor of West, 476, and became practically sovereign of Italy.

O'DONNELL, Irish family; descended from Conall Gulban, *s.* of V.-cent. Irish king, Niall; rulers of Tyrconnel and rivals of O'Neills of Tyrone. Chief members: (1) **MANUS** (*d.* 1564), succ. his *f.* as The O'D., 1537; adopted cause of Gerald Fitzgerald and invaded Pale, 1539-40. (2) His *s.* and heir, **CALVAGH** (*d.* 1566), deposed him, 1555, but was captured by Shane O'Neill, 1561; restored by England, 1566. (3) His grandson, **HUGH ROE** (1572-1602), is famous in Irish history and legend; became the O'D., 1592, and led opposition to England.

ODONTORNITHES, sub-class of Fossil Birds having jaws furnished with sharp teeth. Two divisions are distinguished, the *Odontolcæ* represented by N. Amer. *Hesperornis*, with teeth sunk in a groove, somewhat resembling an ostrich, but with legs adapted for swimming, and the **ODONTOTORMÆ**, containing *Ichthyornis*, with teeth sunk in distinct sockets and well-developed wings.

ODONTOSPERMUM, a genus of composite plant containing about a dozen species, which occur around the Mediterranean. *O. pygmacum* is one of the best-known species, and is peculiar on account of its habit of retaining its seeds in dry weather, and setting them free when the moist condition of the soil would favor germination.

ODORIC, ST. (*c.* 1286-1331), Ital. missionary; Franciscan friar; set out with Irish minorite, James, *c.* 1316, and was absent about 12 years, passing through Persia and India and across China. O.'s journey added to information acquired by Marco Polo nearly all that was known in Middle Ages. His narrative was freely used in Sir John Mandeville's *Travels*.

ODYLIC FORCE, supposed all-pervading force, at one time held to explain 'mersmerism' and 'animal magnetism.'

ODYSSEUS, ULYSSES, in Gk. legend the son of Laërtes. The chief events of his life were his long service in the Trojan War, his protracted homeward voyage so full of adventure, his return to his faithful wife Penelope, and his vengeance on her suitors. See HOMER.

ODYSSEY. See HOMER.

ŒCUMENICAL, ECUMENICAL (Gk. *Oikoumenege*, inhabited world), universal; applied to General Councils of whole Church.

ŒDEMA; the infiltration of serous fluid into the tissues or cavities of the body, particularly with regard to the subcutaneous connective tissue, collections of serum in internal cavities, or when widely diffused being more generally known as dropsies. Œdematous effusions are characteristic of most forms of inflammation, and are due to the natural effect of the body to rid itself of the irritating agents by flooding the part with white corpuscles.

OEDENBURG, a tn. in Hungary, cap. of co. of same name, 19 m. S. E. by E. of Wiener Neustadt, situated in a wine-producing district. Its chief manufs. are agricultural implements, sugar, preserved fruits, etc. Pop. 34,000.

ŒDIPUS (classical myth.), Theban king; exposed in infancy because of prophecy; found by shepherd and adopted by king of Corinth; journeyed to Thebes, unwittingly slaying on the road his father Laius; delivered land from Sphinx (*q.v.*), and married his mother Jocasta, ignorant of her identity. A plague consequently fell on the land, and when the incest was discovered, Jocasta committed suicide, and Œ., self-blinded, wandered forth a beggar.

The Œ myth appears in Homer, but is best read in the *Œdipus Tyrannus* of Sophocles, one of the most magnificent tragedies ever written.

OEHRINGEN (29° 10′ N.; 9° 30′ E.), town, Würtemberg, Germany. Pop., 3,600.

OELS, OLS (51° 12′ N.; 17° 21′ E.), town, on Oels, Silesia, Prussia. Pop., 12,000.

OELSCHLÄGER, ADAM (1600-71), Ger. traveller; *b.* at Aschersleben. His greatest works are a narrative of the Russ. and Persian legation, and a history of Holstein.

OELSNITZ (50° 27′ N.; 12° 10′ E.), town, on Weisse Elster, Saxony, Germany; carpets. Pop., 14,000.

OELWEIN, a city of Iowa, in Fayette co. Its industries include railroad shops and machine shops. It is the center of an extensive agricultural community. Pop. 1920, 7,455.

OEMLER, MARIE CONWAY (1879-); an American author, *b.* at Savanah, Ga., *dau.* of Richard Hoban and Helena Browne Conway. She was educated mainly at home. In addition to contributing to various magazines including Century, The Woman's Home Companion, Ladies' Home Journal and Harper's Bazaar, she was the author of: *Slippy McGee, 1917*; *A Woman Named Smith, 1919*; *Purple Heights, 1920*; and *Where the Young Child Was and Other Christmas Stories, 1921.* She married John Norton Oemler, of Savanah, Ga., in 1901.

OERTEL, HORST (1873); pathologist, born at Oberlossnitz by Dresden, Saxony, son of Col. Julius and Evelyn Lossinitzer Oertel. He was educated at Yale also the universities of Berlin, Leipzig and Wurzburg. He became an instructor in pathology at New York University in 1898 and was afterwards connected with several colleges and universities, in this capacity. However he was also director of the Russell Sage Institute of Pathology, New York, from 1907-12, pathologist to City Hospital, New York, 1903-11, and spent 1913 and 1914 doing research work in Guys Hospital, London. In 1919, he became Strathcona professor of pathology and director of the pathological laboratory and museum of McGill University and pathologist-in-chief to Royal Victoria Hospital, Montreal. Author: *General Pathology, 1921.*

OESEL, OR OSEL, isl.; Esthonia; Baltic Sea (58° 40′ N., 22° 30′ E.); agricultural and forest industries; exports ponies, grain, potatoes, fish, spirits. Chief tn., Arensburg. Area, 1,010 sq. m.; pop. 60,000. In Oct., 1917, the Germans landed on the island and organized it as a base against Russia.

ŒSOPHAGUS, a tube lined with mucous membrane which is separated by cellular tissue from its muscular foundation. The muscular fibres are striped in the upper portion and unstriped in the lower. The mucous membrane is thrown into a number of longitudinal pleats to allow of stretching. Compound racemose glands secrete a viscid mucus, and occur throughout the whole length of the G., though they are most numerous at the bottom. In man the tube is 9 to 10 in. in length, and from ½ to 1 in. in diameter, and extends from the lower part of the pharynx, passes along the front of

the spine, and terminates with about 1 in. of it in the abdomen at the cardiac end of the stomach. Among certain mammalia, *e. g.* ruminants, a layer of voluntary muscle in the G. allows of antiperistaltic movements being induced by which food can be regurgitated into the mouth.

OETA (38° 48′ N., 22° 14′ E.), mountain, ancient Greece; modern Katavothra.

OEYNHAUSEN (52° 10′ N., 8° 30′ E.), watering place, Westphalia, Prussia; saline springs. Pop. 3,500.

OFFA (*d.* 796), king of the Mercians (from 757); defeated Wessex at *Bensington*, 779; created Mercian archbishopric at Lichfield, 787; boundary (*Offa's Dyke*) made between Mercia and Wales.

OFFENBACH (50° 7′ N., 8° 45′ E.), town, on Main, Hesse, Germany. Pop. 1919, 75,380.

OFFENBACH, JACQUES (1819-80), operetta composer; *b.* Cologne; lived in Paris; best works include *Orphée aux Enfers, La Belle Hélene, Madame Favart*, and *Contes d' Hoffmann, 1881.*

OFFENBURG (48° 27′ N., 7° 56′ E.), town, on Kinzig, Baden, Germany; textiles. Pop. 1919, 16,246.

OFFERTORY (Lat. *Offertorium*, a place of offering; an oblation), in the Roman Catholic Church, a sentence said or sung at Mass after the Creed, when this is said. In the Church of England the name is applied to the offertory-sentences appointed to be read by the minister after the Creed or sermon at the Communion, while the alms of the people are being collected.

OGDEN, a city of Utah, in Weber co., of which it is the county seat. It is on the Oregon Short Line, the Southern Pacific, the Rio Grande Western, and the Union Pacific and other railroads, and at the junction of the Weber and Ogden rivers. It is the center of an important mining region and its industries include iron foundries, lumber mills, boot and shoe factories and other industrial plants. It is the seat of the Weber Stake Academy, the State Industrial School, State School for the Blind, and State School for the Deaf and Dumb. Pop. 1920, 32,804.

OGDEN, ROBERT CURTIS (1836-1913), *b.* at Philadelphia, Pennsylvania, 1902 graduated from Yale College. Member of a firm of dry goods merchants from 1885-1907 when he retired. In 1889 a member of the State Johnstown Flood Relief Commission. Was a director of various schools. Appointed a member in 1909 of Taft's Commission to Liberia but declined. Author of: (booklets) *Samuel Chapman Armstrong Founder's Day Address, Hampton, Virginia, 1894*; *Pew Rents and the New Testament, Can They Be Reconciled, 1892*; *Sunday School, 1894.* Wrote for periodicals.

OGDEN, ROBERT MORRIS (1877), an American college professor, *b.* at Binghampton, N. Y., *s.* of James Sherman and Beulah Maria Carter Ogden. He was educated at Cornell and at the University of Wurzburg. After being connected with various American universities, he became professor of education at Cornell University in 1916, and was also made chairman of the Cornell Summer Session in 1919. In addition to contributing to the Psychol. Rev. and other journals he was the author of: *An Introduction to General Psychology, 1914*; and translated (with Max Meyer) *The Problem of Form in Painting and Sculpture*, by Adolph Hildebrand, in 1907.

OGDEN, ROLLO (1856), an American newspaper man, *b.* at Sand Lake, N. Y., *s.* of Rev. Isaac Gray and Emma Huntington Ogden. He was educated at Williams College, also at Andover Theological Seminary and at Union Theological Seminary. After being associate pastor of the First Church, Cleveland, for one year, he was ordained a Presbyterian minister in 1881, after which he was a missionary to the City of Mexico until 1883, and then pastor of the Case Ave. Church, Cleveland, until 1887. He then engaged in literary work in New York and was the editor of the New York Evening Post from 1903-20 when he became editor of the New York Times.

OGDENSBURG, a city of New York, in St. Lawrence co. It is on the New York Central and Rutland railroads, and at the junction of the St. Lawrence and the Oswegatchie rivers. Its industries include grain elevators, flour and lumber mills, leather factories, silk factories, clothing factories, etc. It is connected by steam ferry with Prescott, Canada. The city has a large river trade. Its public buildings include U.S. government building, an academy, a public library and a hospital. Pop. 1920, 14,609.

OGG, FREDERICK AUSTIN (1878), an American college professor, *b.* at Solsberry, Ind., *s.* of William R. and Sarah S. Ogg. He was educated at De Pauw University, Indiana University and at Harvard. After being a professor of history at various American colleges and universities he became associate professor of political science at the University of Wisconsin in 1914 where he

was made professor of political science in 1917. He became associate editor of the American Political Science Review in 1916, and was also editor of the Century Political Science Series. He was the author of several books including *Introduction to American Government* (with P. O. Ray), *1921*.

OGIER THE DANE, a hero who, according to the Carolingian romances, had a feud with Charlemagne and was imprisoned by him. The valor he subsequently showed against Charlemagne's enemies, the Saracens, brought about a reconciliation.

OGILVY OF AIRLIE, JAMES, LORD (*c.* 1549-1606), Scot. noble; supporter of Queen of Scots; ancestor of Earls of Airlie (*q. v.*).

OGLESBY, RICHARD JAMES (1824-1899), an American soldier and a governor of Illinois, *b.* in Oldham County, Ky. As a youth he removed to Decatur, Ill., was for a while a carpenter, meanwhile studying law, and began to practice in 1845. He resigned from the state senate to enter the Federal Army, in which he distinguished himself at Fort Donelson and Fort Henry, rising to the rank of major-general of volunteers. Incapacitated by wounds in 1864, he resigned. In the following year he was elected Governor of Illinois, was re-elected in 1872, but declined in order to enter the U. S. Senate, in which he served during 1873-9. In 1885 he was again elected Governor.

OGLETHORPE, JAMES EDWARD (1696-1785), Eng. soldier; securing parliamentary grant of $50,000, sailed with a contingent of debtors and founded Georgia (named after George II.); tried for failing to overtake Prince Charles's army in '45 rebellion, but acquitted.

O'GORMAN, JAMES ALOYSIUS (1860-), a United States senator, *b.* at New York, *s.* of Thomas and Ellen O'Gorman. He was educated at the College of the City of New York and at New York University. After studying law at the latter institution he was admitted to the bar in 1882 and later was justice of the Supreme Court of N. Y. for 11 years but resigned from the bench when elected United States senator in 1911 and after serving for the term of 1911-17 resumed the practice of law in the firm of O'Gorman, Battle & Vandiver, New York.

O'GORMAN, THOMAS (1843-1921), Bishop, *b.* in Boston, Massachusetts. Studied in St. Paul, Chicago and France and was graduated in 1863. At Rochester, Minnesota was pastor 1867-1878 and 1878-1882 a member of the Paulist Community in New York. Pastor, 1882-1885 at Fairbault, Minnesota and was the first president of College of St. Thomas, Merriam Park, St. Paul. At the Catholic University, Washington, professor of dogmatic theology, 1886-1890, professor of modern church history, 1890-1895. In 1896 consecrated bishop of Sioux Falls. Author of: *A History of the Roman Catholic Church in the United States*.

OGOWÉ (3° S.; 14° 30′ E.); river, Fr. Equatorial Africa, flowing by delta into Atlantic; length, 700 miles.

O'HARA, THEODORE (1820-1867), Confederate colonel and poet; *b.* Danville, Kentucky; *d.* Barbour county, Alabama. He was a lawyer and then a naval officer before entering the army in 1846 to take part in the Mexican War as a captain and major of cavalry. In memory of the Kentucky men who fell at the battle of Buena Vista in that conflict he wrote his celebrated poem, *The Bivouac of the Dead*. When the Civil War came he joined the Confederate forces (having resigned from the federal army in 1856), and served as colonel of an Alabama regiment.

O'HIGGINS, BERNARDO (1778-1842), Chilean patriot; fought for revolution and commanded against Spain, 1813; fought under San Martin, 1817-18; administrator of Chile, 1817-23; overthrown by democratic rising.

O'HIGGINS, HARVEY J. (1876-), an author, *b.* at London, Ont., Can., *s.* of Joseph P. and Isabella Stephenson O'Higgins. He was educated at the University of Toronto. Author: *The Smoke Eaters, 1905*; *Don-a-Dreams, 1906*; *A Grand Army Man, 1908*; *Old Clinkers, 1909*; *Polygamy, 1914*; *Silent Sam, 1914*; *Adventures of Detective Barney, 1915*; *From the Life, 1919*; and *The Secret Springs, 1920*. With Harriet Ford: *The Argyle Case, 1912*; *The Dummy, 1913* and *On the Hiring Line, 1919*. Also with Judge Ben B. Lindsey: *The Beast and the Jungle, 1910*; and *The Doughboy's Religion, 1919*.

OHIO, northeastern inland state, U. S. (40° N., 83° W.); bounded on N. by Michigan and Lake Erie, E. by Pennsylvania and (separated by Ohio R.) W. Virginia, S. by Kentucky and (separated by Ohio R.) Virginia, and W. by Indiana; cap. Columbus.

Ohio, lying on the borderland of Alleghany plateau and prairie plains, is, in general, a vast undulating plain, with average elevation of *c.* 850 ft. above sea-level, the extremes being 425 ft. and

1,540 ft. (Hogues Hill). The central part is flat; a low ridge stretches S. W. across the state, and N. of this the country slopes gently to Lake Erie, the southern portion being rather hilly. This divide also separates the waters of Lake Erie—with its principal rivers, the Tuscarawas, Cuyahoga, Sandusky, Huron, and (only partly in the state) the Maumee—from the waters of the Ohio, whose chief tributaries are the Muskingum, Scioto, Great Miami, and Little Miami. See Map of U. S.

Ohio is extensively devoted to agriculture, the chief crops being cereals (corn, wheat, oats), hay, potatoes, beet sugar, fruits, and vegetables, as well as tobacco. Horse and cattle breeding and dairy farming are important. There are foundries and machine shops, and other industries include iron and steel working; manufacture of carriages and wagons; clay products; boots and shoes; clothing; lumber and timber working, planing, etc.; printing and publishing; rubber goods; flour and grist working; and slaughtering. The mineral resources are considerable, chiefly coal, and also petroleum and natural gas; sandstone and limestone are quarried, and Portland cement manufactured; salt is produced. The most important cities are Cleveland on the edge of Lake Erie, Cincinnati, Toledo, Columbus, Dayton, Youngstown, Akron. There are six ports on Lake Erie. Ohio is divided into 88 counties and has almost 10,000 m. of state railways.

Ohio was developed as part of North-West Territory by New England settlers; admitted as state of Union, 1803; great floods, March, 1913. Has a governor, senate (33 members), and house of representatives, 124; represented in Congress by 2 senators and 22 representatives. Education is compulsory from six to fifteen. There are from 30 to 40 universities and colleges, notably State Univ., Columbus; Ohio Univ. (state), Athens; Cincinnati Univ. (city); Western Reserve Univ.; Wesleyan Univ., Delaware; and Oberlin Coll. (non-sectarian). Area, 41,040 sq. m., of which, exclusive of Lake Erie, 300 sq. m. are water; pop. 1920, 5,759,394.

OHIO NORTHERN UNIVERSITY, a co-educational seat of learning, situated at Ada, Ohio, and chartered in 1904 after developing from a normal school dating from 1871. It is under the control of the Methodist Episcopal Church. The curriculum includes the liberal arts, education, engineering, law, commerce, music and the fine arts. In 1922 it had a student roll of 1137 and a faculty of 65 under the presidency of A. E. Smith, D. D., Ph. D.

OHIO RIVER (37° 16′ N., 88° 20′ W.), tributary of Mississippi, formed by junction of Monongahela and Allegheny rivers at Pittsburgh, Pennsylvania, U. S. A.; *c.* 970 miles long; separates states of Ohio, Indiana, and Illinois from W. Virginia and Kentucky; chief tributaries, Muskingum, Scioto, Wabash, Big Sandy, Great Kanawha, Kentucky, Green, Cumberland, and Tennessee; most important towns on banks, Pittsburgh, Cincinnati, Louisville, and Portsmouth; a great highway of commerce; subject to floods; disastrous inundations, March 1913.

OHIO STATE UNIVERSITY, a co-educational institution, in Columbus, Ohio, founded in 1870. It is under the control of the State. It has an enrollment of about 8,000 students and a faculty numbering about 650. The library contains about 240,000 volumes.

OHIO, UNIVERSITY OF, a co-educational seat of learning situated at Athens, O., chartered in 1804. The departments include a college of liberal arts, state normal college, summer school and extension classes. In 1922 there were 1,483 students and a teaching staff of 100 under the direction of E. B. Bryan.

OHIO WESLEYAN UNIVERSITY, situated at Delaware, O., was founded in 1841 under the auspices of the Methodist Episcopal Church, first as an academy, and then as a college of liberal arts. The institution became co-educational in 1877 by the incorporation with it of the Ohio Wesleyan Female College. There are college preparatory classes, schools of music and fine arts, a school of oratory, and a school of business. It had 1623 students in 1922 and 103 teachers under the presidency of J. W. Hoffman, D.D. LL. D.

OHLAU (50° 56′ N.; 17° 18′ E.), town, on Oder, Silesia, Prussia; tobacco and machinery. Pop. 9,000.

ÖHLENSCHLÄGER, ADAM GOTTLOB (1779-1850), Dan. poet; *b.* in Copenhagen. His three finest works are *Baldur hin Gode, Palnatoke,* and *Axel og Valborg.*

OHLIGS (51° 10′ N., 6° 40′ E.), town, Rhine province, Prussia; formerly *Merscheid*; cutlery. Pop. 28,000.

OHM.—The practical unit of electrical resistance is the ohm, so named after Dr. G. S. Ohm, the German scientist. If a potential of one volt is applied to the ends of a conductor whose resistance is one ohm, a current of one ampere will flow. The 'International Ohm,' as adopted in 1892 by the British Association for the Advancement of Science, and subsequently indorsed by the International Electrical Congress at

Chicago in 1893, was defined as the resistance of a uniform column of mercury 106.3 cm. in length, at 0° C., and 14.4521 gm. in weight. This differs slightly from the 'B. A.' (British Assn. for the A. of S.) and the 'Legal Ohm,' neither of which are now in use.

OHM, GEORGE SIMON (1787-1854), Ger. physicist; discovered *Ohm's Law.*

OHMMETER, instrument for measuring high resistance offered by a circuit to an electric current; essentially consists of two coils placed with their axes at right angles; at intersection of axes is pivoted small iron needle whose deflection is a measure of the resistance.

OHNET, GEORGES (1848-1918), Fr. novelist; after some experience in journalism, finally devoted himself to writing the romances of social life which, under the general title of *Les Batailles de la Vie,* have attained wide popularity; these include *Serge Panine, 1881*; *Le Maitre de Forges, 1882*; *La Comtesse Sarah, 1883*; *Le Docteur Rameau, 1888*; *Volonté, 1889*; *Nimrod et Cie, 1892*; *L'inutile Richesse, 1896*; *Gens de la Noce, 1900*; during his last years wrote a diary of the war as a *bourgeois de Paris.*

OHRDRUF (50° 48′ N., 11° 44′ E.), town, on Ohr, Saxe-Coburg-Gotha, Germany; porcelain. Pop. 6,500.

OIL is generally a colorless or yellow liquid, which does not mix with water, and is of lower sp. gr. Fat may be looked upon as oil which is solid at ordinary temp. The *essential oils* do not come under the above definition. They are extracted from the leaves, fruits, or seeds of plants, by distillation with or without water, by expression, or by maceration in solid or liquid fat, followed by alcoholic extraction, and are used as flavorings and perfumes. True oils are classed as (1) fatty oils, and (2) mineral oils.

(1) The *fatty oils* are of animal and vegetable origin. The vegetable oils are of immense importance, over 600,000 tons being consumed in the U. K. yearly, mostly grown in the torrid zone. Ground nut, copra, palm kernel, etc., yield over 45 per cent. of oil, less being given by cotton-seed, linseed, etc. The oil is usually obtained by crushing and expressing, but may also be obtained by chemical extraction, petroleum ether and carbon tetrachloride being used as solvents; the residue is oilcake, used for cattle food. Superheated steam decomposes the oils into glycerine and one or more fatty acids—*e.g.*, oleic acid and stearic acid. Some of the fatty oils harden when exposed to air—*e.g.* linseed oil—and are classed as drying oils. The oil-seed trade is a key industry, large quantities of oil being required for soap, paint, varnish, and for edible purposes, such as baking, cooking fat, and margarine. It is also the chief source of the glycerine necessary for explosives.

(2) *Mineral Oils or Hydrocarbon Oils*—These have been known only since *c.* 1860. At this period the extraction of oil from the shales of Scotland and France was started, and the first petroleum well was drilled in America. By distallation a variety of oils are obtained from these sources, beginning with the very volatile and inflammable products (the naphthas and benzoline), and finishing with the darker-colored, viscous, and even buttery products such as vaseline. These products are all mixtures of hydrocarbons belonging to the three groups: (1) paraffins, (2) olefins, and (3) naphthenes. The importance of this class of oils has been increasing to an enormous extent owing to its utilization for ships, motors, and aeroplanes.

Report of Smithsonian Institution estimates the probable future supply of the U. S. at *c.* 5,763,100,000 barrels. See PETROLEUM.

OIL CAKE. See OILS.

OIL CITY, a city of Pennsylvania, in Venango co. It is on the Erie, the Lake Shore and Michigan Southern, the Pennsylvania railroad, and at the junction of Oil Creek and Allegheny river. It is the center of an important petroleum region and from this it receives its name. It has large oil refineries, pipe works, iron foundries, engine and boiler works, wagon works, etc. The public buildings include a public hospital and a library. Pop. 1920, 21,274.

OIL, COTTONSEED. See COTTONSEED OIL.

OIL ENGINE, see ENGINE.

OIL PIPE LINES are used to convey raw petroleum from the wells to the refinery, usually on the seaboard. The idea of conveying oil in pipes was conceived by Gen. S. D. Karns in 1860. The first line to be built, however, was the work of J. L. Hutchinson in 1862, and was a siphon over a hill in New York State. He built a second line about 3 miles long in the following year, through which oil was pumped. Both of these were abandoned owing to joint leakage. Considerable rioting by the teamsters and others interested in the transportation of oil by truck attended the early operation of the first successful line of von Syckle in Pa., in 1865. The line was only 4 miles long, but it marked the beginning of the great pipe systems of today, in use all over the world. The

usual system consists of 4 to 8 inch dia. pipes, laid underground, with expansion joints or bends at intervals. Pumping and storage stations are located at intervals of about 30 mi., to maintain the flow. Because of the high viscosity of the oil in cold weather, scrapers called 'go-devils' are put through the pipes occasionally to prevent their clogging. Rifled pipes are used in California, where the oils are very heavy.

OIRON (47° N., 0° 15′ W.), town, Deux-Sèvres, France; old castle.

OISE.—(1) (49° 24′ N., 2° 24′ E.), Dep., N. France, formed of old provinces Ile-de-France and Picardy; undulating surface with fine forests; chief rivers, Oise, Aisne, and Lerain; cap. Beauvais; principal products, cereals, flax, vegetables, beetroot, fruits; manufactures iron, textiles, leather, lace, chemicals, cider, sugar. Area, 2,272 sq. m.; pop. 411,000. (2) Riv. France (49° 54′ N., 3° 50′ E.); trib. of Seine; canalized; navigable to Chauny; length, 186 m.

OJIBWAS, see INDIANS, AMERICAN.

OKAPI, see GIRAFFE FAMILY.

OKEECHOBEE LAKE, a lake in southern Florida, about 40 miles in length and 25 miles in breadth. Its waters are discharged through the Everglades.

OKEHAMPTON (50° 45′ N., 3° 59′ W.), town, Devonshire, England; has ruined castle; remains of Rom. road. Pop. 1921, 3,456.

OKEN, LORENZ (1779-1851), Ger. philosopher and scientist; *b.* in Baden, and studied at Würzburg and Göttingen. In 1807 he became prof. at Jena—first of Med. and subsequently of Natural Science. In 1828 he went to Munich, having been obliged to resign his chair at Jena for political reasons. Finally he taught at Zürich, where he died.

OKHOTSK, SEA OF (50° N., 147° E.), arm of North Pacific, with Kamchatka on E., island of Sakhalin and E. Siberia on W.

OKI (36° 16′ N., 133° 10′ E.), group of islands, N. of Izumo province, Japan. Pop. 6,300.

OKLAHOMA, south central state, U. S. (35° 30′ N., 97° W.), bounded N. by Colorado and Kansas, E. by Missouri and Arkansas, S. by Texas, W. by Texas and New Mexico. Surface consists chiefly of prairies and rolling plains rising in N. W. corner to elevated tableland, which forms part of Great Plains; Wichita and Arbuckle Mts. in S., Ozark Mts. in E., and Chautauqua Mts. in W. are principal elevations; most important river in state is Arkansas, with tributaries Salt Fork, Cimarron, and Canadian Rivers; Red R. forms southern boundary of state, and has as its affluents N. Fork, Washita, and Kiamichi waters. Plains are treeless, but many of hills well wooded; river valleys and certain upland districts fertile and well cultivated. See Map of U. S.

Chief crops are corn, wheat, hay, oats, and cotton; barley, flax, tobacco, vegetables, and fruits also produced; stock raising important industry, particularly in W.; sandstone, gypsum, limestone, granite, and petroleum found, besides smaller quantities of coal, zinc, and lead. Manufacturing industries are unimportant, except flour and grist milling and cottonseed oil. Chief towns are Guthrie (cap.), Oklahoma City, Tulsa, Muscogee, Enid, and Okmulgee.

Oklahoma land was opened for public settlement, 1889; organized as territory, 1890. Oklahoma and Indian Territory proclaimed one state in 1907. State has governor, senate (44 members), and house of representatives (100 members). Represented in Congress by 2 senators and 8 representatives. System of Initiative and Referendum prevails. There are some 6,500 m. of railway. Area, 70,057 sq. m., of which 643 sq. m. are water; pop. 1920, 2,028,283.

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE, situated at Stillwater, Okla., was established in 1891. Its courses taken by both sexes and embrace, in addition to farming and technology, military science, domestic science and teaching, mathematics, physics, English philosophy and history. It is supported by both State and Federal funds. In 1922 the students numbered 2,279 and the teachers 107 under the direction of J. B. Eskridge.

OKLAHOMA CITY, a city of Oklahoma, the capital of the State and the county seat of Oklahoma co. It is on the Sante Fe, the Chicago, Rock Island and Pacific, the Missouri, Kansas and Texas, and the St. Louis, San Francisco railroads, and on the North Canadian river. It is the chief trade center for an extensive agricultural and oil producing region, and in recent years it has developed greatly as a manufacturing city.

It has flour mills, cotton gins, packing houses, publishing houses, oil refineries and soap factories. Pop. 1920, 91,295.

OKLAHOMA, UNIVERSITY OF, situated at Norman, Okla., was established by the first Territorial legislature in 1890. It is co-educational and supported and controlled by the State through the State Board of Education. It has a

graduate school, college of arts and sciences, and schools of education, journalism, public and private business, social service, home economics, fine arts, law, medicine, pharmacy and engineering. In 1922 there were 3,900 students and a teaching staff of 163 under the supervision of the Board of Regents.

OKMULGEE, a city of Oklahoma, in Okmulgee co., of which it is the county seat. It is on the St. Louis and San Francisco railroads, and is the center of an extensive coal, oil and gas region. Its industries include the manufacture of window glass and bottles. It has a hospital, and an old council house of the Creek Indians. Pop. 1920, 17,430.

OKU, YASUKATA, COUNT (1845), Jap. soldier; distinguished himself at the defence of Kumamoto Castle against the Satsuma insurgents, 1877, and in the war with China, 1895; commanded the 2nd Army in the Russo-Jap. War, 1904-5, winning the battle of Kinchau; later was employed in Manchuria; made a count, 1907; was chief of the general staff, 1906-12, and promoted field-marshal, 1911.

OKUMA, SHIGENOBU, COUNT (1838-1922), Jap. statesman; in 1868, when war broke out against the ancient régime, advocated abolition of the prevailing feudal system, and the establishment of constitutional government, subsequently became minister of finance, 1869-81; foreign minister, 1888-9; secured revision of the old treaties with the object of throwing Japan open to world trade; minister of agriculture and commerce, 1896-97; premier on the retirement of the Marquess Ito in 1898, and again in 1914; founded the Waseta Univ. at Tokio and the Jap. Women's Univ.; has pub. *Fifty Years of New Japan, 1910.*

OKYO, MARUYAMA (1733-95), Jap. artist; realist of remarkable gifts; painted all subjects, but excelled with birds and flowers. His influence was immense, and is still felt.

OLAF, OLAUS, kings of Norway.—**OLAF I.** (969-1000), after piratical youth, introduced Christianity with great cruelty; leaped into sea after defeat by Danes and Swedes.—**OLAF II.,** *the Saint* (995-1030), also attempted to enforce Christianity.

ÖLAND, OELAND (57° 3′ N., 9° 34′ E.), Swed. island in Baltic; area, *c.* 520 sq. miles; produces cereals; town, Borgholm. Pop. 230,000.

O'LAUGHLIN, JOHN CALLAN (1873), an American newspaper and magazine writer, *b.* at Washington, *s.* of John and Mary Osborne O'Laughlin. After a public school education he took a course in European diplomacy at Columbia. He began newspaper work in 1893 and after various connections including Washington correspondent of the Chicago Herald, 1914-17, he became vice-president of Lord & Thomas, Chicago, in 1917. He made a specialty of foreign affairs, went to Venezuela in 1902 and reported on the blockade, was in Russia during the Russo-Japanese War and also acted as secretary to Theodore Roosevelt in Africa and Europe. He served in France in 1918 as commanding major with the intelligence section of the General Staff and later as secretary for the United States Inter-Allied Munitions Council, and in 1921 became assistant to the chairman of the U. S. Shipping Board. He wrote numerous articles for magazines and was the author of: *With Roosevelt from the Jungle Through Europe, 1910,* and *Imperiled America, 1916.*

OLBERS, HEINRICH WILHELM MATTHIAS (1758-1840), Ger. astronomer and physician; discovered minor planets *Pallas, 1802*; *Vesta, 1807*; and five comets; rediscovered *Uranus, 1781.*

OLBIA, ancient port on E. coast of Sardinia; remains survive of Rom. city but not of previous Gk. town; called *Civita* in Middle Ages, and afterwards *Terranova.*

OLBIA (*Borysthenes*), ancient Gk. colony on Euxine, at mouth of Hypanis; established by Milesians, *c.* 655 B. C.; destroyed by Getæ, 50 B. C.; rebuilt by Romans; destroyed by Goths, *c.* 248 A. D.; interesting excavations.

OLD AGE PENSIONS.—The industrial system existing in all civilized countries today renders acute the problem of providing for the old age of the poorer type of laborer. In rural communities, the aged parents remain part of the family, and are usually able, with the help of their children, to provide for the meagre wants of their declining years. In the cities and manufacturing centers, however, there is a tendency to turn off the older laborer in order to make way for the younger man who is a quicker and more efficient worker. A laborer over the age of forty-five finds it increasingly difficult to obtain work, and by the age of sixty many of them find it impossible. Much attention has been given to the problem in all civilized countries, and the grant of old age pensions by the state has been adopted in some instances. In the United States, there is no general system of old age pensions, either by the Federal or State Governments. In some states, employees of the state receive old age pensions, and

the custom also exists in some industrial concerns and many of the railroads. In the army and navy, officers and men are retired on half- to three-quarter pay after 30 to 40 years of service at the age of 62 (in some cases 64). Some system of Old Age Pensions is in existence, however, in many other countries. In Great Britain, since 1908, pensions are granted, to those qualifying, at the age of 70, and in Denmark, since 1891, at the age of 60. In New Zealand, pensions are given at the age of 65, and in Australia the age is 60 for women and 65 for men. In France, pensions for permanent invalidity are given as well as for old age—the latter at the age of 70. The amounts granted range in different countries, and in the same countries under varying conditions, from $12 to $130 per annum, and in all countries proof of necessity is required.

OLDBURY (51° 38′ N., 2° 34′ W.), town, Worcestershire, England; iron- and steel-works. Pop. 30,000.

OLDCASTLE, SIR JOHN (*d.* 1417), Eng. Lollard; friend and companion of Prince Henry; imprisoned as heretic, 1413; escaped, failed in attempted risings, but remained concealed in Welsh Marches till 1417; hanged and burned.

OLD CATHOLICS.—On promulgation of the doctrine of papal infallibility by Vatican Council of 1870, some Roman Catholics (including renowned scholars like Döllinger) refused to accept the doctrine and were excommunicated. A conference took place at Munich, and others have been held since, with the result that an Old Catholic Church was formed, and relations were entered into with the Eastern and Anglican Churches. There was further divergence from official Catholic doctrine, and only the Councils up to 787 were accepted. Marriage of the clergy and other departures from Roman tradition were sanctioned.

OLDENBARNEVELDT, JOHAN VAN (1547-1619), Dutch statesman; accepted reformed religion and assisted house of Orange in freeing Holland from Spain. Advocate of Holland, 1586, and became chief authority in state; opposed Maurice of Nassau's foreign policy, 1600-9, and forced him to accept peace, when Spain agreed to recognize Dutch independence, 1609.

OLDENBURG (53° 5′ N., 8° 10′ E.), (1) Republic of N. W. Germany, composed of (*a*) republic of Oldenburg, bounded N. by North Sea, W., S., and E. by Hanover; (*b*) republic of Lübeck, since 1803; (*c*) republic of Birkenfeld, since 1815. Surface flat; coast dist. marshy, with rich agriculture and pasture land; inland known as Geest, chiefly heath and moorland; principal rivers, Weser, Hunte, Hase; several lakes. Industries include brick making, brewing, gem cutting (agates), fisheries; extensive agriculture and fine live stock (especially horses). Became duchy, 1777, grand duchy, 1815, and republic Nov., 1918. Oldenburg has a Landtag (48 members). Prevailing religion is Prot. Total area, 2,479 sq. m.; pop. 391,200; with Lübeck and Birkenfeld, 421,500. (2) Cap. of above; has palace, fine library, and art galleries; leather goods, soap, machinery, musical instruments. Pop. 30,200.

OLD FORGE, a borough of Pennsylvania, in Lackawanna co. It is on the Delaware, Lackawanna and Western railroad and on the Lackawanna river. It is the center of an extensive anthracite coal region and its industries are related chiefly to the mining and shipping of coal. There are also silk mills. Pop. 1920, 12,237.

OLDHAM (53° 32′ N., 2° 8′ W.); town, Lancashire, England; one of leading cotton towns; also manufactures silks, machinery, leather. Pop. 1921, 148,300.

OLDHAM, JOHN (1653-83), Eng. poet; wrote *Pindaric Odes*; best known as a writer of satires against the Jesuits.

OLD RED SANDSTONE, the name given to the succession of sandstones, shales, and thin bands of concretionary limestones which lie between the Silurian and Carboniferous rocks.

OLD TESTAMENT.—The word Testament is an incorrect trans. of Gr. word *diatheke*, 'a covenant,' and passed into general use to describe the covenants, or agreements, made by God with His people in the old and new dispensations.

The O. T. was written in Hebrew with the exception of a few parts which were in Aramaic. The Septuagint is a trans. into Greek, traditionally supposed to have been made by seventy scribes; its date is about 270 B. C., and it is of great importance to students of the O. T., and also because of the influence it exercised on the diction of the N. T. The Vulgate, which is a later version, was prepared by Jerome at the close of the IV. cent. A. D., and is accepted as the authorized version of the R. C. Church. In the Eng. Bible there are thirty-nine books; in Heb. MSS. and Bibles the number is twenty-four, the difference being accounted for in the grouping of several books into one.

The canon (Gr. *kanon*, 'a rule') is the books of the Holy Scriptures accepted by the Christian Church as containing an authoritative rule of religious faith and practice. There exists no formal account

of the formation of the O. T. canon, but behind the selection there lay well-defined principles, recognition only being given to books which were well known, which were associated with some great name, or which related to the nation.

The O. T. is divided into three groups: (1) the Law, containing the five books of Moses; (2) the Prophets; (3) the Hagiographa (the sacred writings), containing Psalms, Proverbs, Job, and the five Megillôth, so called because each is written on a separate roll (Song of Solomon, Ruth, Lamentations, Ecclesiastes, Esther). The threefold division rests on a historical basis. The section of the Law was given a canonical place as a whole in the V. cent. B. C. The Prophets although collated and arranged, were not included in the canon for a time, the cessation of the living voice of Prophets doubtless being an impulse towards this; they were accepted as canonical at the beginning of II. cent. B. C. The Hagiographa, although in existence at that time, lacked the authority of the Law and the distinctive voice of the Prophets, and were not considered so sacred; their position, however, was gradually established, and they were admitted as canonical by 100 B. C. Although the claim to the admission of the Song of Solomon and Ecclesiastes was questioned, the explanation of this being that there had been no definite decision by any authoritative council, but merely a consensus of opinion, the Council of Jamnia, A. D. 90, admitted both, and did not question the Book of Esther, about which a difference of opinion seems to have existed; by end of II. cent. all doubts seem to have been removed.

Parts of the O. T. were committed to writing 1,000 years B. C., being at first copied on skins and later on papyrus in the form of rolls. For several hundreds of years no vowel signs were used, and the consonants were written without spaces between words; in III. cent. A. D. what was described as full writing was introduced, certain consonants being used to express unchangeably long vowels. A later development (VI. cent.) was the introduction of a system of points to indicate the traditional pronunciation. Although the Heb. Scriptures must have been copied by thousands, many were destroyed for various causes, the earliest in our possession being part of the prophetic writings, A. D. 916. There are, however, various versions in Greek, Syriac, and Latin, and the Vulgate already mentioned, all of which contribute towards a more accurate knowledge of the Books of the O. T.

OLD TOWN, a city of Maine, in Penobscot co. It is on the Maine Central, the Bangor and Aroostook railroads, and on the Penobscot river. It has excellent water power from the river and is the center of a large and important lumber industry. It is famous for the manufacture of canoes. Pop. 1920, 6,956.

OLEAN, a city of New York, in Cattaraugus co. It is on the Pennsylvania, the Erie and the Pittsburgh, Shawmut and Northern railroads. Its industries include petroleum works, lumber mills and tanneries. It has a large supply of natural gas which is used both for fuel and for lighting. It has a public library and several educational institutions. Pop. 1920, 20,506.

OLEANDER (*Nerium*), genus of evergreen plants, order Apocynaceæ; native of Asia, N. Africa, S. Europe; very poisonous.

OLEFINES, hydrocarbons ($C_n H_{nn}$) resembling the paraffins in physical properties; lower members are gases, higher are liquids or solids. *Ethylene* (C_2H_4), the simplest Olefines, is formed by destructive distillation of coal; therefore present in coal gas. Higher o's exist in tar distilled from bituminous shales.

OLEIC ACID ($C_{13}H_{34}O_2$), organic compound occurring in fats and oils, commonly prepared by saponifying an oil (such as olive oil), with the addition of lead acetate; the lead oleate thus formed is finally treated with hydrochloric acid, which extracts o. acid; colorless, solid, without smell; B. P. 223°.

OLEOMARGERINE. See MARGERINE.

OLÉRON (45° 57′ N., 1° 15′ W.), island, Charente-Inférieure, France, at mouths of Charente and Seudre.

OLFACTORY SYSTEM, THE, embraces the external and internal nose, which form air passages below and the organ of smell above. The upper part of the external nose is formed from the nasal bone and a process of the upper jawbone; the upper end is joined to the frontal bone, and beneath the lower end, the bridge, the upper and lower lateral cartilages and the smaller cartilagines minores define its shape. The internal nose consists of the two *nasal fossæ* (opening at the nostrils), separated by the *nasal septum*, which is covered by the mucous membrane of the nose. Each of the fossæ is occupied by three *turbinted* bones, which run horizontally from front to back, each being rolled up like a scroll, forming a space below for the passage of air. It is in the highest passage and turbinated bone that the olfactory nerve, or nerve of smell, terminates, ending in

several branches which pass into the mucous membrane. The fossæ terminate at the back end in slits leading into the pharynx, and near the orifices of the Eustachian tube leading to the drum of the ear.

OLGIERD (*d.* 1377), grand-duke of Lithuania; extended territory at Russia's expense; defeated and drove back Tatar hordes, 1362.

OLHÃO (36° 58′ N., 7° 46′ W.), seaport, Portugal, on Atlantic; fisheries. Pop. 7,300.

OLIGARCHY (Gk. *'oligarxia*), 'the government of the few,)' was the name given to that form of constitution amongst the ancient Greeks where a portion of the community were in possession of power, *e. g.* the governments of Thebes, Megara, and Corinth. At the present time it corresponds with the term 'aristocracy,' but in ancient times, although it was acknowledged that an 'aristocracy' often developed into an O., the two were distinguished, 'O.' signifying the government of the wealthy, who were looked upon as directing their efforts towards their own aggrandisement and the maintenance of their own power and privileges, while 'aristocracy' meant the rule of the really best people for the public good.

OLIGOCENE SYSTEM, a geological system, subdivision of Cainozoic or Tertiary series, resting on Eocene strata and beneath Miocene.

OLINDA (7° 53′ S., 34° 54′ W.), town, Pernambuco, Brazil; formerly capital. Pop. 8,200.

OLIPHANT, LAURENCE (1829-88), Brit. author; *s.* of Sir Anthony Oliphant, Chief Justice of Ceylon. His first works were books of travels called *A Journey to Khatmandu* and *The Russian Shores of the Black Sea*. These were followed by two important books on China and Japan, *Minnesota and the Far West* and a *Narrative of the Earl of Elgin's Mission to China and Japan in 1857-59*. His later years were devoted to occultism, the influence of which is seen in *Sympneumata, Scientific Religion*, and *Masoliam*.

OLIPHANT, MARGARET OLIPHANT (1828-97), Brit. novelist; *née* Wilson; *b.* at Wallford, Midlothian. She was a prolific writer of novels and critical sketches, and is most successful in depicting scenes from simple Scot. life.

OLIVARES, GASPAR DE GUZMÃN, COUNT OF, DUKE OF S. LUCAR (1587-1645), Span. courtier and statesman: ruled Spain as chief favorite of Philip IV., 1621-43, and was made by nation and king scapegoat of disasters abroad; extravagant, corrupt, and inefficient; driven from office, 1643.

OLIVE (*Olea europæa*), tree, order Oleaceæ, cultivated from early times for its fruit, especially in Mediterranean region, to which it is indigenous. The fruit is plum-like and possesses an oily mesocarp from which o. oil is obtained by pressure. The cultivated form, unlike the wild parental stock, is thornless, and has larger and more oily fruit. The foliage is lanceolate and greyish green in color, and the flowers have a tetramerous calyx and corolla, with two stamens and a bilocular ovary.

OLIVE OIL, a fixed oil expressed from the fruit of the olive tree, *Olea europæa*, of the natural order Oleaceæ. The olive tree has been cultivated from the earliest times in Greece, Italy, Southern Spain, Asia Minor, and other Mediterranean countries, and has been introduced into Mexico, Chile, Peru, the southern states of America, Australia, China, S. Africa, etc., though the chief supply of the oil still comes from the Mediterranean coasts.

OLIVEIRA MARTINS, JOAQUIM PEDRO DE (1845-94), great Portug. writer; *b.* at Lisbon. His first important work was *O. Socialismo*, which revealed his sympathy with the industrial classes. His *History of Potrugal* is important.

OLIVENZA (38° 33′ N., 6° 58′ W.), town, Estremadura, Spain; fortified; tanning, potteries. Pop. 10,500.

OLIVER, GEORGE TENER (1848-1919), United States Senator; *b.* in Ireland. In 1868 graduated from Bethany College. Admitted to the bar, 1871 and practiced from 1871-1881 at Pittsburgh. 1881-1901 in the steel and iron manufacturing business. Was publisher since 1900 of some Pittsburgh papers. From 1881-1884 president of the Pittsburgh Central Board of Education. 1904-1916 was a delegate to the Republican National Convention and elected to the United States Senate for an unexpired term 1909-1911. Re-elected for term of 1911-1917.

OLIVES, MOUNT OF, MOUNT OLIVET (31° 47′ N., 35° 16′ E.), mountain ridge, E. of Jerusalem; favorite resort of Christ and disciples.

OLIVETANS, small mendicant order with Benedictine rule; founded, 1324; still exists.

OLIVINE, olive green mineral, occurring in lavas, basalts, gabbros, and sometimes in meteorites; composed of silicate

of iron and magnesium. See CHRYSOLITE.

OLLA PODRIDA, OR OLLA ESPAÑOLA (literally 'putrid pot'), so called from its miscellaneous contents, is a stew made of meat, fish, poultry, vegetables, and other ingredients, very common in Spain.

OLLIVIER, OLIVIER EMILE (1825-1915), Fr. statesman; one of 'the Five' who opposed Napoleon III.'s despotism; chief instrument in obtaining constitution in 1869; committed Princes Pierre Bonaparte and Joachim Murat for trial 1870; held responsible for Franco-Prussian War, which overthrew his ministry; his numerous works included *Démocratie et Liberté, 1867*; *Solutions Politiques et Sociales, 1894*; and *L'Empire Libéral, 18 vols. 1895-1908.*

OLMSTEAD, CHARLES TYLER (1842) Bishop; *b.* at Cohoes, New York. In 1865 graduated from Trinity College and in 1866-1868 professor of mathematics at St. Stephen's College. In the year 1868 ordained a minister of the Protestant Episcopal Church. Rector 1884-1899 of Grace Church, Utica, New York and vicar of St. Agnes' Chapel, Trinity Parish, 1899-1902 at New York. 1902 consecrated bishop co-adjutor of Central New York and became bishop of Central New York in 1904.

OLMSTEAD, FREDERICK LAW (1870); *b.* in Staten Island, New York. Graduated from Harvard College in 1894. Under his father's tuition studied landscape architecture. In 1895 began practice of landscape architecture and was a member of a Brookline, Massachusetts firm. Was the landscape architect of various parks and homes including the Roland Park Company of Baltimore and the Metropolitan Park System of Boston. In 1917 a member of the committee on emergency construction, War Industries Board.

OLMSTED, VICTOR HUGO (1853), an American statistician, *b.* in Marion, Ohio. Educated at George Washington University. In 1884 admitted to the bar and from 1883-1889 in the General Land Office deciding contested land cases. Employed by the United States Labor Commission in 1900 and from 1900-1901 investigated labor conditions in the Hawaiian Islands. In 1906-1914 he was chief of the Bureau of Statistics. Since 1913 field agent of the Bureau of Crop Estimates, United States Department of Agriculture.

OLMUTZ (49° 36′ N.; 17° 17′ E.); tn., archiepisc. see, Moravia, Czecho-Slovakia; on isl. in March R.; fortress until 1886; manufactures malt, beer, sugar, starch; cathedral, XIV. cent.; univ., 1581, was suppressed in 1855, except theological faculty; Ferdinand I. here resigned crown to nephew, 1848. Pop. 22,300.

OLNEY (52° 9′ N.; 0° 42′ W.); town, Buckinghamshire, England; residence of Cowper.

OLNEY, RICHARD (1835-1917), an American politician, *b.* in Oxford, Massachusetts. He was graduated from Brown University in 1856 and was admitted to the Boston bar in 1859. Counsel for many years of Eastern railroads. In 1874 a member of the Lower House of the Massachusetts Legislature. Appointed by President Cleveland in 1893 Attorney General of the United States and from 1895-1897 he was Secretary of State.

OLONETS (62° 30′ N.; 37° E.); government, N. W. Russia; area, 49,355 sq. miles; contains Lake Onega; produces timber, cereals; manufactures iron goods, leather, flour. Pop. 450,000.

OLOPAN (VII. cent.); Nestorian missionary to China; first to introduce Christianity there.

OLORON-SAINTE-MARIE (43° 12′ N., 0° 35′ W.), town, Basses-Pyrénées, France; tanneries.

OLTENITZA (44° 8′ N.; 26° 43′ E.); town, Rumania, at junction of Argesh and Danube; here Turks twice defeated Russians, 1853-54.

OLUSTEE, BATTLE OF, a Civil War engagement fought in Florida near Olustee station to the southeast of Lake City. Judged by the small numbers engaged on both sides, it was the most sanguinary battle of the war. The Union forces numbered 5,500 men, horse and foot, and 16 guns. The Confederates had 4,600 infantry, 600 cavalry and 12 guns. The battle took place on February 20, 1864, and ended at dusk with the withdrawal of the Union forces to St. Mary's and Jacksonville with a loss of 203 killed, 1,152 wounded and 506 missing. The Confederates lost 93 killed, 847 wounded and 6 missing. Most of the coast towns and forts in Florida were captured by the federals in the first two years of the war, but the state remained Confederate, and after the battle of Olustee it was lost to the Union till the close of hostilities.

OLYMPIA, plain in Elis, in Peloponnesus, where celebrated Olympic games took place; bounded on W. by Cladeus and S. by Alphesus Rivers, on N. by group of hills, chief of which, Cronion

as sacred to Cronus. Situated on plain as Altis, or sacred Grove of Zeus, surounded by walls with several gates, and ontaining temples, public buildings, and ountless statues. Name O. was given o buildings in and around Altis. Prinipal features within Grove were: (1) emple of Zeus Olympius, containing tatue of Zeus by Pheidias and other mous statues; (2) Temple of Hera; (3) emple of Mother of the Gods; (4) elopium, precincy, sacred to Pelops; 5) Philippeium, erected by Philip of acedon to celebrate battle of *Chæronea*; 3) Treasuries; (7) Zanes, bronze statues f Zeus; (8) Great Altar of Zeus; (9) rytaneum. Outside Altis were: (1) tadium, in which foot races and games ere held;(2) Hippodrome, where chariot nd horse-races took place; (3) Gymasium and (4) Palæstra, both used for xercise of competitors; (5) Leonidæum; 6) Boulenterium of Council Halls; (7) oman Triumphal Arch; (8) Roman ouse believed to have been occupied by ero, and many other buildings. Festials were celebrated every four years, nd interval between called *Olympiad*; atalogue of victors began in 776 B. C. nd ended *c.* end of IV. cent. A. D. estivals were controlled by Pisa till its estruction by Eleans and Spartans, *c.* 72 B. C.

OLYMPIA, a city of Washington, the apital of the State, and the county seat f Thurston co. It is on the Northern acific Railroad, and on the De Shutes iver and Puget Sound. The city is onnected by steamship with Victoria nd other cities, on Puget Sound, as well s with the principal Pacific ports. Its ndustries include boot and shoe factories, ce factory, iron works, pipe works, saw ills, flour mills, etc. The public buildngs include the State Capitol, including court house and several academies and ospitals. Pop. 1920, 7,795.

OLYMPIAD, see CHRONOLOGY.

OLYMPIC GAMES, see ATHLETICS.

OLYMPIODORUS, name of several Gk. authors, especially (1) the historian f Honorius' reign, *b.* Thebes, Egypt, . cent. A. D.; (2) a philosopher of lexandria in V. cent. A. D., teacher of roclus; (3) the last Alexandrian Neolatonist, in VI. cent. A. D.; (4) the ristotelian commentator, in VI. cent. . D.

OLYMPUS.—(1) (40° 4′ N., 22° 20, .), mountain range, separating Maceonia and Thessaly; legendary home o, he gods. (2) (39° 57′ N., 29° 20′ E.)' ountain, on borders of Mysia, Bithynia nd Phrygia, Asia Minor.

OLYNTHUS, city of ancient Greece; became chief city of Chalcidice, 432, establishing Chalcidic Confederation, which extended power to Pella; might have been bulwark against Macedonia, but weakened by jealousy of Sparta and Athens; destroyed by Philip, 348.

OLYPHANT, a borough of Pennsylvania, in Lackawanna co. It is on the Delaware and Hudson, the Wilkesbarre and Eastern, and the New York Ontario and Western railroads, and near the Lackawanna river. It is the center of an extensive anthracite coal region and its chief industries are connected with the mining and shipping of coal. In addition there are manufactures of blasting powder, iron and steel products, cigars, silk, etc. Pop. 1920. 10,236.

OMAHA, a city of Nebraska, in Douglas co. It is the largest city in the State in population and the most important industrially. It is on nine trunk lines of railroads and 22 branch lines. These include the most important transcontinental lines. It is also on the Missouri River, 500 miles west of Chicago. The river is here spanned by many great bridges which connect Omaha and Council Bluffs, Iowa. The total area of the city is about 38 square miles. There are 800 miles of streets, admirably laid out. Omaha is the chief trade center of a great agricultural and stock raising region. It is the first city in the United States in the production of butter, and the second largest corn and live stock market. It ranks fourth as a railroad center. The city is well placed on a plateau which rises into bluffs which are used chiefly for residential sites. The business district is near the river. Omaha is sometimes called the Gate City, from its geographical position with reference to the Far West. It has a large wholesale trade in automobiles, groceries, oil, commission products, agricultural implements, dry goods and lumber, coal, etc. The chief industry is meat packing. Other important manufactures are flour, butter, food products, clothing, boots and shoes, rubber goods, steam engines, boilers, etc. There is an excellent school system, with an enrollment of about 40,000 pupils. There are many institutions for higher education including Creighton University, University of Omaha, Omaha Medical College. The city has over 80 public and private schools. In the public library are over 150,000 volumes. Among the public buildings are a city hall, including a court house, U. S. government building, auditorium and Protestant Episcopal and Roman Catholic cathedrals. The city is the site of the Nebraska Institu-

tion for the Deaf and several large hospitals. Here is the military headquarters of the Department of Missouri. Within the city limits is Fort Omaha and Fort Crook adjoins it on the south. It is a branch city for the Federal Reserve Bank and of the Federal Land Bank.

Omaha was first settled in 1854 and its importance began when it was selected as the eastern terminus of the Union Pacific Railroad. Stockyards were established in 1884. In 1898 the Trans-Mississippi Exposition was held here. In 1920 Omaha was chosen as a half-way station of the Trans-Continental Air Service. Pop. 1920, 191,601.

OMAHA, UNIVERSITY OF, situated at Bellevue, Nebraska, was founded in 1880 under Presbyterian auspices as a co-educational seat of learning. It is also known as Bellevue College, its original name. The institution has a normal school, academy, school of music and art in addition to the collegiate and graduate departments. There were 592 students and 18 teachers in 1922 under the presidency of D. E. Jenkins.

OMAHAS, a tribe of N. American Indians, about 1300 in number, who inhabit a reservation in E. Nebraska. Tney are of Siouan stock, and originally dwelt around St. Peter's R., Minnesota, where they subsisted chiefly by agriculture.

O'MALLEY, FRANK WARD (1875), an American illustrator and writer, *b.* in Pittston, Pa. He studied architecture, drawing and painting in the Art Students' League, in Washington, D. C., and in the Academy of Fine Arts, in Philadelphia, Pa. During 1902-6 he was an illustrator for various publications, contributing light verse as well, later becoming a member of the staff of the New York Sun as a special writer. He has written *The Head of the House* (a play in collaboration with Edward Waterman Townsend, produced in 1909); *A Certain Party* (a play, produced in 1910), and *The War Whirl in Washington, 1918.* He has also been a voluminous contributor to the magazines.

OMAN (22° 30′ N., 56° 30′ E.), Arab state, Arabia, between Persian Gulf, Gulf of O., and Ind. Ocean; area, 82,000 sq. miles; surface mountainous; capital, Muscat; produces fruits, vegetables, cereals. Pop. 500,000.

OMAR KHAYYAM, the astronomer-poet of Persia; *b.* Nishapur, Khorassan, *c.* 1050 A. D. He co-operated in a wonderful reconstruction of the Persian calendar. As a poet he has great popularity owing to Eng. translations by Fitzgerald (*q.v.*).

OMAR PASHA, MICHAEL LATTAS (1806-71), Turk. general; writing-master to Abdul-Medjid; defeated Russians at Danube, 1853-54; repulsed 40,000 Russians at Eupatoria, Crimea, 1855; crushed rebellion in Bosnia and Herzegovina, 1861; captured Cettinje, 1862.

OMBRE, card game in vogue in England during reign of Queen Anne; mentioned by Pope; three or four may play; object is to win the pool; game is Span. in origin.

OMDURMAN (15° 36′ N., 32° 47′ E.), town, Egyptain Sudan, on Nile; trading center; scene of Kitchener's victory over Khalifa, 1898. Pop. 50,500 (under 1,000 Europeans).

OMEGA, the last letter in the Greek alphabet, the name for the Greek long 'O.' From the expression in the Book of Revelations, 'I am Alpha and Omega, the beginning and the end,' the letters Alpha and Omega become symbolical with the early Christians. Inscriptions on public documents and tombstones in the first centuries began with these two letters, meaning 'In the name of God.'

OMEN, the divining of the future, in various religions. A very common method was to examine the entrails, especially the liver, of a sacrified animal. Owing to the amount of blood it contained, it was natural to regard it as the seat of life. The exact steps by which it came to be believed that by the peculiarities of the liver the will of the gods could be ascertained, are uncertain. A regular system of interpretation came to be followed out, something like that of palmistry or phrenology. A system of divination was practiced in Babylon before 2,000 B. C., and in Greece and Rome in early times. Another system of taking omens in Rome was from the way the sacred chickens took their food. The flight of birds, especially eagles, was also watched for portents.

OMNIBUS (Lat. *omnibus*, 'for all'), vehicle introduced by Pascal, who obtained patent to run public coaches in Paris, 1662. Shilibeer, 1797-1866, ran the first Omnibus in London, 1829.

OMSK, tn., cap., general government of the Steppes, Russian Central Asia (54° 55′ N., 73° 28′ E.); at junction of Om and Irtish, on Trans-Siberian Ry.; brick and pottery works, breweries, distilleries, tobacco, oil, and soap manufactories; dairy produce largely exported; contains cathedral and fortress. Pop. *c.* 100,000.

ONAGRACEAE, a dicotyledonous natural order consisting chiefly of perennial

herbs, though it includes a few shrubs and trees; leaves simple and flowers usually tetramerous, with inferior ovary; among better known forms are willow herb (*Epilobium*), with plumed seeds, *Fuchsia*, *Oenothera* (evening primrose), and *Circæa* (enchanter's nightshade).

ONEGA (61° 45′ N., 35° 30′ E.), one of the largest European lakes, in Russia; drains into Lake Ladoga; area, 3,765 sq. miles.

ONEGLIA (43° 53′ N.; 8° 2′ E.), town, on Gulf of Genoa, Italy; wine, oil. Pop. 8,600.

ONEIDA, a lake in the co. of New York, 6 m. to the N. W. of Oneida City, between the counties of Oswego, Oneida, Onondaga, and Madison. It is 20 m. long by 5 m. wide, and is drained by the Oneida R. into Lake Ontario.

ONEIDA COMMUNITY, famous American settlement, founded by John Humphrey Noyes at Putney, Vermont, 1838, and removed by him to neighborhood of Oneida, 1847. Plan is original Christianity, combining communism, trade, and 'the simple life'; communism extended to wives till interference of legislature, 1882, but deeply religious character of settlement prevented 'complex marriage' system degenerating into 'free love'; community prospered, and was formed in 1881 into Oneida Co., and is noted for quality of its manufactures and agricultural produce; model villages are built for employees.

ONEIDA, a city of New York, in Madison co. It is on the New York, Ontario and Western, and the New York Central railroads, and on Oneida Creek. Its industries include flour mills, a planing mills, steam knitting mills, foundries, steam engine works, and carriage factories. Pop. 1920, 10,541.

O'NEIL, CHARLES (1842-), a rear admiral of the United States Navy, *b.* at Manchester, Eng., *s.* of John and Mary Anne Frances O'Neil. He entered the United States Navy in 1861 as a masters mate and served throughout the Civil War, participating in an engagement with the Confederate iron clad 'Merrimac' and in both attacks on Fort Fisher. After being promoted through various ranks he was made a rear admiral in 1901 and retired in 1904.

O'NEILL, Irish family; lords of Tyrone; descended from famous Irish king Niall, *d.* 405, *s.* of King Eochaidh Muighmheadhoin, and called 'of the nine hostages'; frequent figure in Irish legend and history; among his fourteen sons were Laeghaire, ancestor of O'Coindhelbhains; Conall Crimhthainne, ancestor of O'Melaghlins; Fiacha, ancestor of MacGeoghegans and O'Molloys; Maine, ancestor of O'Catharnaighs; Eoghan, ancestor of O'Neills; and Conall Gulban, ancestor of O'Cannanains and O'Doneils.

O'NEILL, EUGENE GLADSTONE (1888), an American playwright, *b.* at New York City, *s.* of James and Ella Quinlan O'Neill. He was educated at Princeton and Harvard Universities. He was engaged in various lines of business in the United States, Central and South America until 1914 after which he devoted his entire attention to playwrighting. Author: *Beyond the Horizon, 1919*; *Emperor Jones, 1921*; *Different, 1921*; *The Straw, 1921*; *Gold, 1921*; and *Anna Christie, 1921*.

O'NEILL, JAMES (1847-1920), actor; *b.* Ireland, and came to the United States in his boyhood. He first appeared on the stage at Cincinnati in 1867, and soon after took leading roles in stock and touring companies. In San Francisco he took the part of Christ in the Passion Play and for fifteen years played Edward Dantes in *Monte Cristo*. He was successful also as D'Artagnan in Grundy's version of *The Three Musketeers*.

ONEONTA, a village of New York, in Oksego co. It is on the Delaware and Hudson and other railroads. Its industries include shirt factories, cigar factories, foundries, grain elevators, etc. Pop. 1920, 11,582.

ONION (*Allium cepa*), a Liliaceous plant of Asiatic origin, cultivated for culinary purposes; possesses a tunicate bulb, and hollow, centric leaves; flowers white, and arranged in cymose umbels.

ONIONS, OLIVER, Eng. novelist, wrote *The Odd Job Man*, *Little Devil Doubt* and *Good Boy Seldom*; in addition to the novels mentioned, he has written *Widdershins*, *In Accordance with the Evidence*, *The Debit Account*, *The Story of Lonie*, *The Two Kisses*, *A Crooked Mile*, *Mushroom Town*, and *The New Moon*, *1918*.

ONONDAGAS, an Indian tribe belonging to the Iroquois. Their territory was Central New York in the present Onondaga county. They were one of the leading members of the Six Nations, and their village was regarded as the capital of the Iroquois. The legendary Hiawatha, who organized the Iroquois, was supposed to be an Onondaga chief. Many of the tribe emigrated to Canada, after the Revolution, in which they sided with the British. Their descendants have a clannish community on the Grand River, Ontario; the remainder of

the tribe are on several reservations in New York State.

ONTARIO (43°-57° N., 79°-95° W.), premier prov. of Dominion of Canada; bounded S. and W. by the St. Lawrence R. and the Great Lakes; stretches N. to James Bay, W. to Manitoba, and E. to Quebec; greatest length from E. to W., *c.* 1,100 m.; extreme breadth, *c.* 650 m. Surface is undulating; there are no considerable ranges of hills, although the Laurentian Hills continue W. to Lake Huron; a watershed of elevated land separates the basins of the Ottawa and the St. Lawrence. Principal rivers are Ottawa, which separates prov. from Quebec, and St. Lawrence which is the boundary between Ontario and U. S.; the chief rivers which traverse the prov. are tribs. of the Ottawa. Lakes are Nipigon, Nipissing, etc. Prov. is very fertile, and has immense mineral wealth. Nickel is extensively mined near Sudbury; iron occurs in great abundance to N. of Lake Superior. Coal, however, is absent, and Ontario depends partly on Nova Scotia and partly on the U. S. Since regions N. of Lake Superior were opened up, gold and silver have been mined in increasing quantities; cobalt, arsenic, and bismuth ores also exist; large petroleum wells in co. of Lambton. Settled and agricultural portion of the prov. lies S. of Laurentian Hills, *c.* 30 per cent. of the surface is covered with forests, from which the provincial government derives one-fourth of its revenues. Agriculture is the great industry of Ontario, which can raise every crop suited to a temperate climate. Maize, grapes, apples, tomatoes, peaches, and tobacco grow freely in open air. Dairy farming is extensively carried on, and supplies numerous butter and cheese factories.

Industries are important; chief articles produced are farm machinery, carriages, railway rolling stock, cottons and woolens, leather goods, and furniture; pork packing and lumbering trades also very large. Electrical energy from the Niagara Falls is supplied over a large area. The settled portion of the prov. is covered with a network of railways (9,500 m.).

The Ontario Agricultural Coll. at Guelph is an important institution. Toronto is the cap.

The province is administered by a lieutenant-governor, assisted by an executive council and a legislative assembly; there is an admirable system of local and munic. government. The prov. is represented in the Dominion Parliament by 24 senators and 86 members of the House of Commons. Area. 407,262 sq. m., including 41,382 sq. m. of water; pop. 2,922,000. See Map of Canada.

ONTARIO, LAKE, the smallest of the four Great Lakes of North America, discovered by Champlain in 1616. Length 190 miles, width 55 miles, maximum depth 738 feet. Area 7,240 square miles; of basin and lake 32,980 square miles. The St. Lawrence River at the northeast end is the outlet. The early colonists made little use of the lake, but in the first decade of the XIX. cent., commerce was greater than on all the other Great Lakes combined. Lake Ontario is connected with Lake Erie by the Niagara River and Welland Canal, with Ottawa River by Rideau Canal and with the Hudson by Oswego Canal. The boundary line between New York and Canada crosses the lake.

ONTARIO, a city of California. Pop., 1920, 7,280.

ONTENIENTE (38° 53′ N., 0° 39′ W.), town, Valencia, Spain; textiles. Pop. 12,500.

ONTOLOGY, science of Being as Being (Gk. *on, ontos,* being).

ONYX, variety of agate (*q.v.*); consisting of alternate layers of white and black, or white and brown chalcedony; used for cameos, brooches, etc.

OOLITE (Gk. 'egg-stone'), variety of limestone composed of very small clustered globules resembling fish roe. The Oolite series of strata consist of limestones, calcareous sandstones; they are members of the Mesozoic or Secondary group; underlie the Cretaceous formations, and rest on the Lias; subdivided into Upper, Middle, and Lower groups, and contain numerous interesting fossil remains.

OOSTERHOUT, a tn. of N. Brabant, Holland, 5 m. N. E. of Breda, with sugar refineries, tanneries, and foundries. Pop. 12,563.

OPAH, KING-FISH, MOON-FISH, OR JERUSALEM HADDOCK (*Lampris luna*), a large, compressed, bright red and green, bony fish, sometimes 6 feet long; found rarely in the Pacific, but chiefly in the North Atlantic and occasionally in British waters.

OPAL, gem-stone, consisting chiefly of silica and water; since ancient times prized on account of its beautiful colors; found in Hungary, Saxony, and S. America; chief varieties—*Precious* or *noble opal* (brilliant reflected colors), *fire*

opal (red reflections), *common opal* (white reflections), and *semi-opal* (opaque).

OPEN-HEARTH PROCESSES for the manufacture of steel from pig iron include the Siemens, Siemens-Martin process and others. The Bertrand-Thiel and Talbot processes may also be considered among these. The steel produced by any of these processes is analogous to the product of the Bessemer converter. Attempts have been made to combine the rapidity of the Bessemer process with the certainty of results obtainable with the open-hearth processes. This combination is not, however in extensive use. Open-hearth processes are conducted in regenerative type furnaces, which provide means for preheating the gases used, thereby obtaining a higher temperature than would be possible without preheating The hearth in which the operation takes place may be composed of silica sand (for acid processes using Bessemer quality pig iron), or chromite, dolomite or magnesite (for basic processes using ordinary phosphoretted pig iron). The decarburization is effected by Hammer scale (Fe_3O_4) or Red hematite (Fe_2O_3) added to the charge when molten. The subsequent addition of Spiegeleisen and Ferro- manganese effect the conversion of the charge into steel. The whole operation requires from 10 to 14 hours, the yield being some 2-3 per cent more than the original charge, (which may be 5-40 Tons) due to the addition of ore.

OPERA, a work for the stage, in which music, words, action, and scenery combine to represent a certain story. The essentials of the form are as old as Grecian art, but it was not until the end of the XVI. cent. that the first specimens of opera, as we now understand it, were produced. These tentative efforts—*Daphne*, 1594, and *Eurydice*, 1600—were the work of Jacopo Peri, a Florentine. Following him came Claudio Monteverde 1568-1643, a Milanese, who gave opera a fresh complexion, and even foreshadowed Wagner in some of his effects. A new epoch opened with the Neapolitan Alessandro Scariatti, (1659-1725), the real founder of Ital. opera so called—that form in which melody takes the chief place, with the singer as the leading personage. Meanwhile opera had been establishing itself outside Italy.

The founder of the Fr. school of opera was Lulli 1633-87, and with him the earliest Fr. operatic composers of note were Rameau, Grétry, and Méhul; their most celebrated successors have been Boieldieu, Auber, Berlioz, Thomas, Bizet, and Gounod. During the XVIII. cent. France became universally regarded as the country in which the merits of operatic compositions were most fully recognized, and many composers of other nationalities paid lengthened visits to Paris. These included Cherubini, Rossini, Donizetti, and Bellini from Italy; Gluck, Meyerbeer, and Flotow from Germany. Well-known examples of Fr. grand opera are Rossini's *William Tell*, Meyerbeer's *Les Huguenots* and *Le Prophete*, and Gounod's *Faust*.

In Germany opera was introduced early in the XVII. cent., but Theile's *Adam and Eve* 1678, was the first true Ger. opera, and the first composer of merit was Keiser, 1673-1739. Gluck, 1714-87, is the next name of importance, and he made many radical changes. Then Mozart, with his *Don Giovanni*, *Figaro*, etc., won recognition as the greatest operatic composer of his generation, and was one of the founders of the Romantic school of opera. Other writers of this school were Schubert, Mendelssohn, Schumann, and Wagner, the most famous of them all. Among living Ger. composers the best known is Richard Strauss.

Eng. opera came into existence with Henry Purcell, 1658-95. The development of dramatic music was much hindered in England, however, by the popularity of Handel and of various Ital. composers, and it was not till the XIX. cent. that real progress was made. Among those deserving mention are Balfe, Wallace, Sullivan, Goring Thomas, Mackenzie, Villiers Stanford, and Ethel Smyth.

In the United States the opera has reached the acme of production, in the Metropolitan Opera House in New York. In creation work, however, the history of opera in America has not been remarkable. Many American operas have been produced, but not of a high order of merit. Walter Damrosch, Herbert W. Hadley and others have produced works of merit.

OPERA GLASS, OR GALILEO'S TELESCOPE, an instrument used for obtaining a magnified image of some distant object. It consists essentially of two lenses, a converging lens as objective, and a diverging lens as the eye lens.

OPHICLEIDE, brass-wind instrument of the family of bugle horns with keys; in reality, the bass of the military bugle.

OPHIDIA, Snakes.

OPHIR, a region, whose exact locality is disputed, famed for its gold. From Ophir the ships of Solomon brought gold, silver, and jewels. Probably it was the country at the mouth of the Indus.

OPHITES (Gk. *ophis*, serpent), ancient Gnostic sect; they had a strange and elaborate cosmogony, in which the world is created by Ialdaboth.

OPHTHALMIA, an inflammation of the eye. The whole globe of the eye is very rarely inflamed, but when the eye is totally inflamed it usually results in the destruction of the organ. Generally only one part is inflamed, usually the conjunctiva, caused by bodies having been introduced between the eyelids.

OPHTHALMOSCOPE, an optical instrument designed for examining the surface of the retina of the human eye. It is also used to examine the refractive properties of defective eyes.

OPIE, JOHN (1761-1807), English painter; noted pictures are *Murder of Rizzio*, *Arthur and Hubert*, *Juliet in the Garden*.

OPINION, affirmation aiming at truth, but not claiming more than approximate truth; unlike a hypothesis, does not look for future verification.

OPITZ VON BOBERFELD, MARTIN (1597-1639), Ger. poet; *b.* Bunzlau; wrote *Trostgedichte in Wiederwartigkeit des Krieges*, *Zlatna* (epics), *Buch von der Deutschen Poeterey* (prose work), besides numerous translations.

OPIUM, dried, milky juice (*latex*) of unripe capsules of the white poppy—*Papaver somniferum*. It is produced chiefly in Asia Minor, India, and China. The opium poppy is cultivated from seed sown from Nov. to March, and successive crops are ready from May to July. The flowers are white or purplish; and a few days after the petals have fallen, when the capsules are about 1½ in. in diameter they are cut around the middle with a knife and left overnight for the juice to flow out and harden. After further drying on poppy leaves, the dark, plastic masses are made into lumps for sale.

Opium is bitter, and has a characteristic smell. Its properties depend upon the nineteen or twenty alkaloids it contains. The chief of these are: *Morphine* (9 per cent.); *narcotine* (5 per cent.); *papaverine* (0.8 per cent.); *thebaine* (0.4 per cent.); *codeine* or *methylmorphine* (0.3 per cent.); *narceine* (0.2 per cent.). Morphine, the most important alkaloid, is separated from the others by extracting the opium with hot water, and boiling the extract with milk of lime. Alcoholic tincture of opium is known as *laudanum*. It contains about 0.75 per cent. of morphine. Opium is used medicinally, mainly to relieve pain and to produce sleep, and for this purpose is best given hypodermically as morphine. It is also employed to relieve vomiting and to stop diarrhœa, to lessen distressing coughing, to stop bleeding in the stomach and intestines; while it is valuable in heart disease, diabetes, in cystitis and other inflammatory conditions, for hæmoptysis, and, as Dover's powder, to cause perspiration in, for instance, common cold. Externally the *linamentum opii* and fomentations sprinkled with laudanum are of value in relieving pain.

Opium is sometimes eaten; its stimulating effect is followed by depression, which produces craving for more. Most opium grown is used for smoking, the Chinese being specially addicted thereto. Nevertheless, they are overcoming the habit; public burnings of opium pipes are taking place, and whole districts are being denuded of the poppy. Opium is very poisonous; one-eighth of a grain has proved fatal to an infant, and four grains to an adult.

A person addicted to opium eating or the morphine habit is usually pale, with dull eyes, suffering from nervous irritability, dyspepsia, and circulatory disturbances, with sometimes albuminuria of glycosuria (albumin or sugar in the urine). The treatment of the condition is to isolate the patient, gradually diminish the amount of opium or morphine, until in a fortnight the quantity has been reduced to nothing. Sudden cessation of the drug may cause serious nervous disturbances and collapse. Cure is usually effected at the end of a few weeks, but relapses are common.

The greatest amount of opium was produced by India, about 80,000 chests, each containing 1 Chin. picul (133⅓ lb.), being exported annually, nearly all to China, while about 5,000 chests were consumed annually in India itself, before 1907. In 1907, on the Chin. Government attempting to put down the use of opium, the Brit. Government offered to reduce the export of Ind. opium to China by one-tenth each year, so that in ten years the export to China would cease altogether, but only on condition that China should reduce her native production at the same time. In 1907 an agreement between Britain and China provided for the progressive reduction of importation from India, on condition that China should stop producing opium. In 1912 China failed to carry out the bargain; she increased the area of production and imposed duties on Ind. opium.

A conference of the Powers at the Hague, Jan. 1912, drew up a convention of twenty-five articles by which they agreed to control the supply of and gradually suppress the manufacture of opium. The export of opium from India to China has ceased since 1917. In 1917-18 exports on private account amounted

to 4,264 chests (the lowest recorded). These went chiefly to Indo-China, Java, and Siam. On government account 8,274 chests were exported.

OPON (10° 15′ N., 124° E.), town, Cebu, Philippine Islands; scene of Magellan's death, 1521. Pop. 13,000.

OPORTO (14° 7′ N., 8° 33′ W.), city, on Douro, Portugal; in province of Entre-Douro-e-Minho; prominent seaport and large commercial center; originally *Portus Cale* before Roman conquest; taken by Visigoths, 540 A. D.; in Moorish hands, 716-1092; prominent through Portug. history; taken by French, 1809; center of port wine trade; woolens, silks, hats, cork-cutting, tanning, soap, tobacco, shipbuilding, iron and steel goods, leather, etc. Pop. 1920, 203,981.

OPOSSUMS, see under MARSUPIALS.

OPP, JULIE (1871-1921), actress; *b* New York City, where she received a convent education; married in 1902 to William Faversham, actor (*q.v.*). Her first appearance on the stage was in 1896 as Hymen in *As You Like It* with Sir George Alexander at the St. James's Theatre, London. Later she became Alexander's leading lady and joined the Frohmans to take leading parts in their productions in support of Faversham. After 1902 she starred with her husband in a series of popular plays, including *The Squaw Man, The World and His Wife, The Barber of Orleans, The Faun,* and *The Prince and the Pauper.*

OPPELN (50° 40′ N., 17° 54′ E.), town, on Oder, Silesia, Prussia; cement, beer. Pop. 34,000.

OPPENHEIM (49° 51′ N., 8° 15′ E.), town, on Rhine, Hesse, Germany; wine; destroyed by French, 1689. Pop. 4,000.

OPPENHEIM, EDWARD PHILLIPS (1866), Eng. novelist; has written a long series of novels which have enjoyed wide popularity, and which are marked by intricacy of plot and by natural and life-like character-drawing; included in these are: *Mysterious Mr. Sabin, Master of Men, The Yellow Crayon, A Lost Leader, Mr. Wingrave, Millionaire; The Missioner, The Temptation of Tavernake, Mr. Grex of Monte Carlo, The Kingdom of the Blind, The Double Traitor, The Other Romilly, Mr. Lessingham Goes Home,* and *The Great Impersonation.*

OPPER, FREDERICK BURR (1857), an American artist, *b.* at Madison, Ohio, *s.* of Lewis and Aurelia Burr Opper. He left school at the age of 14 and the following year went to New York where he later took up drawing as a profession. In addition to being an illustrator for Mark Twain, Bill Nye and others he was on the art staff of Frank Leslie's for 3 years and then an artist for Puck until 1899 after which he was connected with the New York Journal. Originator of *Happy Hooligan,* etc.

OPPY (50° 23′ N., 2° 54′ E.), vil., dep. Pas-de-Calais, France, 7 m. N. E. of Arras; formed a strong point in the Ger. defenses during the battle of Arras, April-May 1917; the British carried the wood in front of it after a bitter struggle; the village was taken and lost, May 3, as the result of a counter-attack by the Prussian Guards; finally occupied by the British, Sept. 1918.

OPSONIN.—A substance forming an ingredient of the blood. Its function is to stimulate the leucocytes (*q.v.*) or white corpuscles, in their fight against disease-producing bacteria. The exact manner in which opsonin assists the absorption of bacteria is not shown. The *opsonic index* is the ratio between the absorbing power shown by normal blood and that shown by the blood of the person under examination. The higher the opsonic index, the greater is the resistance against disease. By injecting into the blood dead bacteria of the species causing the disease, the opsonic index can, in some cases and under some conditions, be raised.

OPTIC NERVE. See EYE.

OPTICS. See LIGHT.

OPTION, right to demand sale of ('call o.') or right to sell ('put o.') stock on a future day at price fixed on day of granting o. A *straddle o.* is a 'put and call o.' in the same stock.

OPTIMISM (Lat. *optimus,* best). In the popular sense of the word, O. means the belief that 'there is a soul of goodness in things evil,' and that whatever exists is right in some inscrutable fashion, or alternatively may simply mean the habit of 'looking on the bright side of things,' which naturally springs from a belief in the ultimate triumph of good. The opposite of O. is pessimism (*q.v.*).

OPTOMETRY, a method of employing other means than drugs for the measurement of the power of human vision, and the adaptation of lenses for the aid of the sight.

OPTOPHONE, the invention of Dr. E. E. Fournier d' Albe, of London, which has for its purpose the translation of light waves into sound waves, thereby enabling the blind to 'read' ordinary printed matter such as books, newspapers, etc. As the letters of a printed

line are passed over by the instrument, a series of musical notes forming tunes, are produced in a telephone receiver, each motif representing a definite letter. Considerable training is necessary for correct interpretation at a reasonable speed. The highest speed attained was 25 words per minute. While the instrument has great possibilities, its prohibitive cost has limited its use.

ORACLE, a sacred spot where a god is supposed to answer questions or make known his will. O's have existed among various peoples and in various religions, but they were a special characteristic of ancient Greece. The most famous was the O. at Delphi. One chief way of consulting an O. was by omens, thus, if the animal sacrificed showed certain characteristics, various inferences were drawn. The other [oracular method was by means of ecstasy. Certain natural gases in a cave threw a priestess into a frenzy, and the cries she uttered were interpreted by priests to those who inquired of the O. The Delphic O. was of some political importance, and by the advice given often helped to determine the foundation of Gk. colonies. Some sayings of the Pythoness (the priestess of Apollo) have come down to us; many are probably spurious. The Delphic O. waned in influence in the III. cent. B. C., but continued sometime longer. Other famous O's were those at Cumæ, Delos, Dodona, Epidaurus.

ORAN (35° 40′ N., 0° 38′ W.), fortified seaport, Algeria, on Mediterranean; contains Grand Mosque, Roman Catholic cathedral, Château Neuf, 1563, Château Vieux (citadel), Fort de la Moune, museum, etc.; taken by Spainards from Moors 1509; flourished in XV. cent. abandoned after severe earthquake, 1792; taken by French, 1831; chief exports are wool, cereals, wine, grain, esparto grass, cattle, sheep, hides, tomatoes, potatoes. Pop. 1921, 141,156.

ORANG, ORANG-UTAN (*Simia*), a genus of Simian Apes (see under PRIMATES), found in the forests of Sumatra and Borneo; vegetarian and arboreal; with brain most like that of man.

ORANGE, fruit of *Citrus aurantium*, a tree included in the Rutaceæ, to which the lemon and the lime also belong. O. trees are very prolific, and bear glossy, evergreen foliage and masses of white, sweet-scented flowers, which yield oil of neroli on distillation. The O. is a native of Asia, probably of Chino-Jap. origin, and was first introduced into Mediterranean countries by the Portuguese, still prominent among its cultivators and exporters.

ORANGE (33° 15′ S., 149° 10′ E.), town, health resort, New South Wales; gold and silver mines. Pop. 7,600.

ORANGE (44° 7′ N., 4° 49′ E.), town, on Aigue, France; in department Vaucluse with Notre Dame; has fine Roman remains (triumphal arch, theatre, etc.); capital of independent principality, XI. cent.; passed to house of Nassau, XVI. cent.; acquired by France, 1713; silks, textiles, etc. Pop. 7,500.

ORANGE, largest S. African river; rises in Kathlamba Mts., in E. of Basutoland, and winds *c.* 1000 miles W. to Atlantic; separates Cape Province from Orange Free State, Griqualand West, Bechuanaland, and German Namaqualand. Chief tributaries are Caledon and Vaal; volume varies greatly in dry and wet seasons; mouth obstructed by a bar.

ORANGE, a town of Connecticut, in New Haven co. It is on the New York, New Haven and Hartford railroad, and is the center of a farming community. It has manufactures of automobiles, ribbons, and buckles. Pop., 1920, 16,614.

ORANGE, a village of Massachusetts, in Franklin co. It is on Miller's river. The industries include the manufactures of sewing machines, automobiles and other machinery. Pop. 1920, 5,393.

ORANGE, a city of New Jersey, in Essex co. It is on the Lackawanna railroad, 4 miles northwest of Newark. It is chiefly a residential city but has also important industries. In the neighborhood are many examples of picturesque scenery including Eagle Rock, 660 feet above sea level and Hemlock Falls. The public buildings include Orange Memorial Hospital, House of the Good Shepherd, Masonic Temple and a public library. Pop., 1920, 33,229.

ORANGE, a city of Texas, in Orange co., of which it is the county seat. It is on the Orange and Northwestern, and the Texas and New Orleans railroads, and on the Sabine river and Intercoastal canal. It is an important commercial city and is a shipping center for rice, cotton and live stock. It has also manufactures of lumber, paper and oil. Pop., 1920, 9,212.

ORANGEBURG, a city of South Carolina, in Orangeburg co., of which it is the county seat. It is on the North Edisto river. It is the center of an extensive rice and cotton growing region and has an institution for the education of colored students. Pop. 1920, 7,290.

ORANGE FREE STATE, or **ORANGE VRIJ STAAT**, inland prov. of the Union

of S. Africa (28° 35′ S., 27° E.), bounded N. and N. W. by Transvaal, W. and S. by Cape of Good Hope, E. by Basutoland and Natal. The surface is an immense plateau from 3,000 to 5,000 ft. above sea-level, generally flat with a few low ridges and numerous isolated hills, known as kopjes, not exceeding 7,000 or 8,000 ft. On the borders of Natal, S. E., are the Drakensberg Mts., with part of Mont aux Sources (11,000 ft.), Platberg (8,000 ft.), Melanies Kop (7,500 ft.), Draken's Berg (5,682 ft.), in the Orange Free State. Rivers are few: Vaal (boundary between Transvaal and Orange Free State), Orange (boundary between Cape Province and Orange Free State), Modder, Caledon, Klip, etc.; none navigable; no lakes. Climate is very healthy, but dry and hot; ann. rainfall, *c.* 20 to 30 in. in northern provinces; average rainfall, *c.* 14 in. in W. and S. W., where droughts are common and severe; hottest in W., where temperatures of 105° F. are not unusual. Flora is scanty; the plains are generally covered with grass after rains, but for many months they are dry and barren; few trees (viz., willow, mimosa, acacia, euphorbia, gum, pepper-trees, aloe, etc.); fauna includes hyena, lynx, baboon, monkey, ant-bear, wild-cat, jackal, springbok. Principal products are wheat, corn, Kaffir-corn, fruit, tobacco; important stock rearing (sheep, cattle, horses, ostriches); coal mines in N.; diamond mine at Jagersfontein in W.; salt pans near Bloemfontein; chief exports are wool, skins, ostrich feathers, hides, mohair, mealies, wheat, meal, and dairy products. Dairy farming is extending. See Map of Africa.

History.—Orange Free State was originally inhabited by Bushmen, Hottentots, and Bantu tribes. Boer settlements were made in 1824; 'Great Trek' by Boers from Cape Colony and agreement with Bantuang chief ceding country between Vet and Vaal Rivers to Boers, 1836, and republic proclaimed with Piet Retief as first commandant-general; annexed by Great Britain, 1848; became an independent Dutch republic, 1854, with president (elected for five years), executive council, and Volksraad (Parliament); enjoyed excellent government under distinguished president (Sir) John Brand, 1864-88; warred with and defeated Moshesh, 1867; 'Conquered Territory' acquired and boundaries fixed, 1870; Kimberley diamond fields (discovered 1867) annexed by Britain, 1871; having formed alliance with Transvaal, Orange Free State joined that republic in S. African War, 1899-1902; annexed by Britain, 1900, and made crown colony as Orange River Colony; responsible government granted, 1907; joined Union of S. Africa, 1909, its old title, 'Orange Free State,' being restored.

Government.—The province is divided into 24 districts; administered by administrator, provincial council (25 members elected for three years), and executive committee (four members); there are 39 municipalities. Principal towns are Bloemfontein (cap.), Kroonstadt, Heilbron, Ladybrand, Harrismith. Dutch Reformed Church predominates; majority of population is Dutch-speaking. Education is generally compulsory; both English and Dutch are taught to all children unless parents object. Area, 50,389 sq. m.; pop., 528,200 (including 181,700 whites).

ORANGE RIVER, OR GARIEP, a river of S. Africa, rising in the Montau Sources, Drakensburg, Basutoland, and flowing generally W. to enter the Atlantic in lat. 28° 38′ S. It forms the N. boundary of Cape of Good Hope, separating it from the Orange Free State, Griqualand W., British Bechuanaland, and Great Namaqualand. Chief tribs., the Vaal and Caledon on the right, and the Hartebeest and Zuku on the left. Its banks are well wooded, but much of the country through which it flows is desert. It is of little use for irrigation owing to the depth of its channel, and sand-bars, shallows, rapids, and falls make navigation impossible. Length 1,100 m.

ORANGEMEN, association of Protestants who uphold Prot. succession to Brit. throne and Prot. religion in Church and State as laid down in Bill of Rights and Act of Settlement, 1688. Its aims were formulated, 1688, by Dr. Burnet, William, Prince of Orange's chaplain. The association still exists, but the term O. is generally used of Ulster Protestants who celebrate anniversaries of the Siege of Londonderry, Battle of the Boyne, July 1, William's landing at Torbay, Nov. 5. It is divided into lodges united in each country in a grand lodge.

ORANIENBAUM (59° 52′ N., 29° 45′ E.), town, summer resort, on Gulf of Finland, Russia. Pop., 6,500.

ORATORIO, a sacred musical composition of an extended nature, the words generally taken from Scripture. The term comes from the *Oratory* in which St. Philippo Neri assembled his congregation to listen to tentative experiments of the kind. The first O's dealt almost exclusively with Christ's sufferings, and consisted chiefly of antiphonies and short choruses. Ital. composers, like Scarlatti and Carissimi, subsequently selected other Biblical subjects for treatment; but it was not until the master-mind of Händel operated on the form that O.

assumed its highest power and interest. Händel's *Messiah* still remains the most popular of all O's, the leader in a splendid series, which includes *Israel in Egypt*, *Samson*, and *Judas Maccabæus*. After Händel, as a master of O., came Mendelssohn, whose *Elijah* and *St. Paul* occupy a front rank.

ORATORY (Lat. *oratorium*, from *orare*, to pray), a small chapel or room, usually attached to a large house, used for purposes of private devotion. In the early days of the Church prayers were said and the Eucharist celebrated in private houses, but as churches became general, many regulations were designed to terminate abuses arising from the use of Os. They were brought under the direct control of the bishop, from whom permission to celebrate Mass had to be obtained. The Council of Trent issued further regulations for the Roman Catholic Church. Os. are called public if they have a door opening into a public road, if not they are called private Os.

ORBETELLO (42° 27′ N., 11° 13′ E.), town, Grosseto, Italy, near Mediterranean. Pop., 7,600.

ORBIT (Lat. *orbis*, 'a ring'), path followed by a celestial body in its revolution round (1) its primary, or (2) a common center of gravity. The earth's O. around the sun (which takes 365 days, 6 hours, 9 mins., 9 secs. to complete) is 186 million miles in diameter, whilst that of Neptune, the farthest known planet, has a diameter of 5,580 million miles. The O. of the earth around the sun is regarded as the plane of the solar system for convenience.

ORCAGNA, the corrupted nickname (from Arcagnuolo, 'archangel') of Andrea di Cione (*c.* 1308- ? 1368), painter, sculptor, and architect; *b.* Florence. He was architect of the church of Or San Michele there, the marble tabernacle of which is his *chef-d'œuvre*. Orvieto Cathedral was also built from his designs.

ORCHARD, a large or small plantation of fruit trees, composed either of a single species or of a variety mixed according to a definite plan.

ORCHARDSON, SIR WILLIAM QUILLER (1835-1910), painter; *b.* Edinburgh and studied there under Scott Lauder. He was elected A. R. A., 1868, and R. A., 1877. He was in the front rank of genre-painters.

ORCHESTRA, a body of performers on musical instruments, where stringed instruments played with the bow constitute an essential feature of the combination. The use of orchestral accompaniment to dramatic music was begun in Italy and France about the beginning of the XVII. cent., Monteverde of Mantua probably having most to do with its development. In his opera *Orfeo* (1608) he employed an orchestra of thirty-six instruments, consisting of harpischords, violins, viols, lutes, guitars, organs of wood, trumpets, flutes, and other instruments. Orchestral music gradually developed into a separate branch of art, and has become perhaps the greatest of all forms of musical composition. Comparatively early, the violin became the leading instrument—a position which it has maintained—and subsequently all instruments of the viol class were discarded in favor of the violin, viola, violoncello, and double bass. This family of instruments constitutes what is termed the full-stringed band. The different kinds of instruments used in the modern orchestra and their numerical proportion to one another are determined partly by the size of the combination and partly by the nature of the works to be performed. An example of a well-arranged orchestra contains fourteen first violins, twelve second violins, ten violas, eight violoncellos, eight double-basses, one harp, three flutes, one picolo, three oboes, one cor anglais, three clarinets, one bass clarinet, three bassoons, one contra fagotto, four horns, four trumpets and cornets, three trombones, one bass tuba, three kettledrums (tympani), one side drum, one bass drum, one triangle, and one pair of cymbals. The manner in which the tones of the different instruments are blended or contrasted in an orchestral composition is termed orchestration or instrumentation. Orchestral music, apart from its use in connection with works of a dramatic nature, received little attention till the beginning of the XVIII. cent. Amongst those most intimately associated with its development are Bach, Gluck, Haydn, Mozart, Beethoven, Schubert, Schumann, Mendelssohn, Berlioz, Wagner, Brahms, Tschaikowsky, Dvorák, and Richard Strauss.

ORCHIDS (*Orchidaceæ*), family containing the most specialised of monocotyledonous plants; characterised by their herbaceous nature, entire and parallel-veined leaves, and irregular flowers with six petal-like segments, one of which forms a variously modified lip. O. occur all over the world, but are most common in tropical countries. In temperate regions generally terrestrial, thousands of tropical species are epiphytic, growing upon branches of jungle under-growth and trees, without being parasitic. Almost all are specially modi-

fied for insect fertilization, most interesting being the arrangement of pollen in club-shaped pollen masses or pollinia, which become glued to the head of any insect seeking the flower's nectar, and are so borne to other flowers. O. are extensively cultivated for the variety and beauty of shape and color; from several species of Orchis salep is prepared, and vanilla from unripe fruit of *Vanilla planifolia*.

ORCHOMENUS (1) ancient Gk. city of Arcadia. Its kings were supreme in Arcadia till VII. cent., when they abandoned Messene to Sparta; site of modern Kalpaki. (2) ancient Gk. city of Bœotia; capital of prehistoric race Minyæ; superseded by Thebes; important excavations.

ORCZY, BARONESS (EMMA MAGDELENA ROSALIA MARIA JOSEFA BARBARA) (1865), playwright and novelist; *b.* Tarnaos, Hungary, *dau.* of Count Felix Orczy; married to Montagu Barstow. She was educated at Brussels, studied painting in Paris and exhibited at the Royal Academy, London. She became a writer of English plays and novels, beginning in 1900 with a series of detective stories for magazine publication. Her most notable work was *The Scarlet Pimpernel, 1905*, which had a great success both as a novel and as a play. A series of other popular novels followed, including *The First Sir Percy, 1920*; *Castles in the Air, 1921*, and *Nicolette and The Triumph of the Scarlet Pimpernel, 1922*.

ORDEAL, the appeal to a supernatural power to settle by some sign a legal decision, has been practised very widely, particularly in the Middle Ages. A favorite method of ordeal was that of making the accused person carry a lump of red-hot iron or walk over red-hot ploughshares. If he escaped unscathed he was innocent. Sometimes he had to plunge his arm into boiling liquid. If a murderer approached the corpse of the person he had murdered, blood, it was thought, would flow out afresh from the wounds.

ORDERIC VITALIS (*c.* 1075-1142), mediæval chronicler; *b.* near Shrewsbury; became priest in Abbey of St. Evroul, Normandy, and devoted leisure to historical research. His *Historiæ Ecclesiasticæ* is a history of England and Normandy.

ORDERS, HOLY, the state of those who have entrusted to them the power of exercising certain functions in the Christian Church. Thus the Anglican Church recognizes three orders—bp's, priests, and deacons; the R. C. Church calls these (with the subdeaconate) the *major orders*; the *minor orders* are acolytes, exorcists, readers, and doorkeepers, but these are now only preliminaries to the priesthood. The Eastern Churches have the same major orders, but only readers besides; the Armenian hierarchy is the same as the Roman. Most Prot. Churches have not episcopal government, though the Lutheran Churches of Scandinavia and some others retain bp's; but a sacerdotalism, and hence 'holy orders' in the Cathlic sense, does not exist.

The early history of orders in the Christian Church is much disputed. Some deny the Catholic claim that the threefold ministry existed from the beginning. Presbyterians defend their Church government on historic grounds. It is probable that at first (*e.g.* in the New Testament) bp's and presbyters were not differentiated. In the early II. cent. the monarchical episcopate was evolved.

ORDERS OF ARCHITECTURE. See ARCHITECTURE.

ORDERS OF KNIGHTHOOD, see KNIGHTHOOD.

ORDINATION, the ceremony at which Holy Orders is conferred in the Christian Church. Early forms are to be found in the Prayer-book of Serapion, Justin Martyr, the *Didache*, and the *Canons of Hippolytus*. In the Roman, Greek, and Anglican churches ordination can be conferred only by a bishop. Among Presbyterians, ordination is performed by the body of presbyters, acting by one of their number previously appointed. Here also the imposition of hands is used. The ceremony by which a bishop is made is called Consecration.

ORDNANCE, see ARTILLERY.

ORDOVICIAN SYSTEM, group of strata occuring below the Cambrian and above the Silurian formations; well developed in region formerly inhabited by **ORDOVICES** (Celtic tribe in Wales); hence name suggested by Lapworth, 1879; Murchison called the group Lower Silurian; consists of all types of sedimentary rocks, as sandstones, slates, and quartzites, or metamorphic rocks, and are widely distributed; divided as follows: Caradoc or Bala series; Llandeilo beds; Arenig beds; contain numerous fossil remains, including molluscs, plants, fish, and insects. The O. period was one of great volcanic activity.

ORDU (41° N., 37° 45′ E.), town, on Black Sea, Asia Minor; ancient *Cotyora*. Pop., 6,000.

ORDUIN-NASHCHOKIN, ATHANASY LAVRENTEVICH (*d.* 1680), Russ. statesman; insisted on carrying on Polish and Swed. Wars till Russ. demands were conceded.

ORE, substance taken from the earth's crust, containing minerals from which on a large scale metals may be obtained with profit. Gangue, vein-stuff, or matrix is the extraneous earthly matter associated with the ore—*e.g.*, quartz. The ore may contain native metal or metal combined with sulphur, oxygen, etc.

Before smelting, the ore undergoes preliminary dressing operations consisting of coarse and fine crushing, breaking up the ore and waste, and so enabling its concentration by screening, sorting, and washing out the waste. The recent introduction of magnetic separators and flotations methods of concentration is a notable advance. Reciprocating or gyrating rock breakers break down blocks of 1½ yds. cube to about 9 inches; high-speed crushing rolls are advantageous when it is desired to obtain a granular product; and stamp mills, which are simply mechanically worked pestles weighing up to 10 cwt. apiece, crush to meshes varying from 1-50 to 1-20 of an inch. For finer crushing, ball mills are used, and the finest grinding is accomplished by tube mills originally devised for grinding cement.

By means of strong electro-magnets ores may be concentrated by extracting minerals containing iron, tungsten, etc. Low grade ores can be concentrated to repay smelting by means of flotation; from a 2-3 per cent. ore concentrates up to 20 per cent. can be produced. The ore is crushed to fine powder with water, to which are added small traces of amyl alcohol, cresol, or other suitable liquid which renders the water capable of frothing, and finally blowing air through the mass. The ore is found concentrated in the froth, while the finely divided quartz, etc., remains suspended in the liquid or sinks to the bottom.

ÖREBRO (59° 16′ N., 15° 12′ E.), town, on Svarta, Orebro, Sweden; iron-mining center; mechanical works. Pop., 1921, 36,033. The län or division of Örebro lies in interior of S. Sweden; area, 3,500 sq. miles. Pop., 1921, 218,397.

OREGON, N. W. state, U. S. (44° N., 120° W.), bounded N. by Washington, W. by Pacific Ocean, S. by Nevada and California, and E. by Idaho; length from N. to S., 375 m.; breadth, 290 m.; area of land surface, 96,699 sq. m.; area of water surface, 1,092 sq. m.; coast-line, *c.* 300 m., steep and rocky with numerous indentations.

Oregon is traversed by volcanic and snow-capped mountains—Cascade Mts. running parallel with coast, with highest peaks, Mt. Hood (11,225 ft.), Mt. Jefferson (10,200 ft.), Pitt (9,750 ft.), Diamond Peak (8,807 ft.); Steens Mts. in S. E. (9,000 ft.); Blue Mts. in E., with average elevation *c.* 6,000 ft.; undulating tableland running eastward, broken by several mountain ranges; extensive plains and large valleys with fine arable and pasture land. Principal rivers are Columbia, Snake, Deschutes, Willamette, Rogue; numerous lakes in S.—viz., Malheur, Harney, Summer, Goose, Warner, Klamath, etc. Climate is varied; mild on coast with heavy rainfall in winter; dry and hot E. of Cascade Mts., with severe winters; irrigation necessary in some parts. Numerous acquatic birds; abundant marine fauna. Extensive forests, especially in W. and mountain regions; chief trees are pine, fir, spruce; also hemlock, cedar, maple, ash, aspen, oak, and others. Principal products are wheat, hay, hops, corn, sugar-beet, potatoes, fruits, timber, live stock, wool, dairy produce; gold, silver, copper, coal are mined; lead, gypsum, quicksilver, nickel, opals found. Chief industries are lumbering, flour milling, fish canning, paper making, printing, publishing, slaughtering and packing, machinery; valuable fisheries (salmon, trout, herring, oyster, halibut, cod, etc.) See Map of U. S.

Spain ceded territory north of 42° to U. S., 1819; Astoria founded by John Jacob Astor, 1811; several trading posts established by North-Western Fur Co. and Amer. Fur Co.; Ind. mission founded 1834; serious boundary disputes between Great Britain and America, which were finally settled, 1846, boundary being fixed at 49° N. lat. Oregon became a state in 1859, and was admitted into the Union.

Oregon has a governor, senate (30 members, elected for four years), and house of representatives (60 members, elected for two years); the state has two senators and three representatives in Congress, and is divided into 36 counties. Principal towns are Portland, Astoria, Salem (cap.), Eugene, Elementary education is compulsory; there are Oregon Univ. at Eugene, State Agricultural College, and other colleges. Total railway mileage exceeds 3,600. Pop., 1920, 783,389.

OREGON AGRICULTURAL COLLEGE, situated at Corvallis, Ore., was founded in 1868 as a land-grant institution and is supported by state and federal appropriations. Its instruction is co-

educational and embraces commerce, engineering, forestry, home economics, mining, pharmacy, vocational education, chemical engineering and military science. In 1922 there were 3,914 students and 267 teachers under the presidency of W. J. Kerr, LL. D.

OREGON, UNIVERSITY OF, is a state co-educational institution situated at Eugene, Ore., and founded in 1872. It gives special courses preparatory to medicine, law, journalism and engineering and has almost a free elective system of undergraduate study. There are also schools of architecture, commerce, education, and of music, the last named embracing instruction in the piano, violin, wind instruments, and harmony, as well as a summer school, school of correspondence study and a graduate school. The tuition is free. There were 2,241 students and a teaching staff of 123 in 1922 under the presidency of P. L. Campbell.

O'REILLY, CHARLES J. (1860), Roman Catholic prelate; *b.* St. Johns, New Brunswick. He studied theology at the Grand Seminary, Montreal, and was ordained priest in 1890 at Portland, Oregon. After being in charge of missions for four years at Oswego and Tegardville, he became, 1894, rector of the Church of the Immaculate Heart of Mary at Portland, resigning in 1903 upon his selection as Bishop of Baker City. In 1918 he was appointed Bishop of Nebraska. He edited *The Catholic Sentinel* for several years.

O'REILLY, JAMES (1856), Roman Catholic prelate; *b.* Ireland. He was educated at All Hallows College, near Dublin. Upon entering the priesthood, he served as assistant priest at churches in Stillwater and Lake City, Minnesota, and afterwards was for twenty-three years, 1886-1909, pastor of the Church of St. Anthony of Padua at Minneapolis, resigning therefrom to become Bishop of Fargo, N. D.

O'REILLY, JOHN BOYLE (1844-1890), Irish-American journalist and poet; *b.* County Meath, Ireland; *d.* Hull, Mass. Of ardent anti-British sympathies, he early indentified himself with the Fenians, in whose interest he enlisted when a youth of nineteen in the 10th Huzzars, aiming to breed disaffection in the British army. In 1866 he was tried and condemned to death for treason. His sentence was commuted to 20 years' penal servitude, and the following year he was sent to West Australia, where in 1869 he succeeded in escaping from the penal establishment and found his way to Philadelphia on an American whaling ship. He became naturalized, and settled in Boston. Having acquired a knowledge of printing and journalism as a boy, he took up editorial work, becoming editor and part owner of the *Pilot*. He reported as a press correspondent the abortive Fenian raid into Canada of 1870. In 1878 he aided the escape to the United States of his convict associates from West Australia. He was a forcible and fluent writer of verse, the best of which was on Australian themes. His novel *Moondyne*, 1879, describing Australian convict life, went through twelve editions. There is a statue of him in Boston.

O'REILLY, PETER J. (1853), a Roman Catholic bishop; *b.* in Dublin, Ireland and educated at Carmeen Latin School and theological studies at All Hallows College, Dublin. In 1877 ordained a priest and came to America in the same year. Consecrated titular bishop in 1900 of Lebedos, Diocese of Peoria.

OREL, or ORLOV (1) Government, Central Russia; cap. Orel; surface undulating and well cultivated; principal rivers, Don, Oka, and Desna, with their tributaries; agriculture chief occupation; horses and cattle are reared; its manufactures include machinery, wagons, leather, and glass; tobacco, oil, hemp, produced. Area, *c.* 18,000 sq. m.; pop. 2,816,200. (2) Tn., cap. of above (52° 55′ N., 36° 7′ E.); produces candles, ropes, oil, flour; distilleries, breweries, tobacco factories; founded at end of XVI. cent; sacked several times in XVII. cent. Pop., 97,200.

O'RELL, MAX, pseudonym of Paul Blouet (1848-1903), Fr. writer of wit and satire; author of *John Bull and his Island*; *Her Royal Highness Woman*, etc.; editor of the *Figaro*, 1901-3.

ORELLANA, FRANCISCO DE (*c.* 1490-*c.* 1550), a Spanish navigator and explorer of the Amazon. He accompanied the Pizarros to Peru, 1531-35, settled Guayaquil, 1537, and joined the expedition in search of El Dorado, 1540-41. They sailed down the Napo, and O. then proceeded down the Marañon to obtain supplies. He followed this river to its mouth, 1541, and named it Amazon from the Indian tales of a tribe of female warriors whom he claimed to have encountered. His attempts to colonize the country, 1544-49, failed.

ORENBURG (1) Government, Tatar Bashkir Republic, E. Russia; contains 500 sq. m. of lakes; steppe land in E.; agriculture important; 'black earth' near Urals is very fertile; stock raising; coal,

salt deposits, copper, gold, iron, and argentiferous lead found. Area, 73,255 sq. m.; pop., 2,272,000. (2) Tn., cap. of above (51° 48′ N., 55° 12′ E.); trade center; textiles, metallic goods, sugar are chief articles of commerce; contains military schools and arsenal; Orenburg-Tashkent strategic railway completed in 1905. Pop., 146,800.

ORENSE (1) (42° 20′ N., 7° 40′ W.), province, Galicia, Spain; mountainous. Pop., 1920, 408,693. (2) (42° 20′ N., 7° 40′ W.), town, capital of above, on Minho; warm springs; XIII.-cent. cathedral; chocolate. Pop., 16,500.

ORESTES (classical myth.), *s.* of Agamemnon and Clytæmnestra; *bro.* of Electra; reared by Strophius the Phocæan with Pylades. On attaining to manhood O. slew his mother and her second husband Ægisthus, who had murdered Agamemnon in revenge for the sacrifice of Iphigeneia. For this he was pursued by the Furies, nor was he given rest till interceded for by Athene, as described in the *Eumenides* of Æschylus.

ORFORD, ROBERT WALPOLE, EARL OF (1676-1745), Brit. statesman; Walpole became First Lord of Treasury and Chancellor of Exchequer, 1715; on collapse of South Sea Co. was called to power, 1721, and retained it for 21 years. One of the greatest Brit. statesmen; decried in later times for cynical sincerity characteristic of XVIII. cent. at its best.

ORGAN. See Biology.

ORGAN, musical instrument found in most churches and large concert halls. The particular sort of pipe or flute, the use of which led eventually to the construction of an O., was the *flûte-à-bec* or beak-flute; that is, a pipe with a mouthpiece, which was placed against the lips to receive the breath of the player. The first step in organ-building was to set several flutes on end over a box of wind supplied by bellows. The contrivance known as *Pan's Pipes,* a graduated series of open pipes fixed together, may have furnished the idea for this. What the earliest O's were like we have no means of determining, for descriptions are meagre and indefinite, and there are no survivals. The instruments mentioned by many of the Latin authors (notably Tertullian) must have been of a rudely primitive kind; if for no other reason than that as yet there was no keyboard. Even when this was invented, in the VI. or VII. cent., the keys were so large and clumsy that they had to be struck with the clenched fist. As late as the XII. cent. the compass did not exceed two octaves, usually without semitones. An O. set up in Winchester Cathedral in 951 was the largest then known, having 26 pairs of bellows operated by 70 men. This instrument had 10 keys, with 40 pipes to each key. Gradually the keys approximated more to the modern form, though for long the sharps were white and the naturals black, the reverse of the present colors. Early in the XV. cent. the important addition of *Pedals* or keys for the feet was made.

No verbal description can possibly convey a clear idea of the construction and working of a large and complicated instrument like the modern O. Broadly speaking, there are three main departments: (1) the pipe-work; (2) the mechanism by which the player is enabled to produce and control the sound from the keys; and (3) the mechanism for blowing. As regards the pipes, these are of two chief divisions—metal pipes and wood pipes. Every 'speaking' *stop* has its separate set of pipes, running usually throughout the entire compass of keyboard or pedalboard. These sets are controlled by the familiar handles to the right and left of the player; so that when the player draws, say, a stop marked 'Flute,' he is operating on a series of pipes constructed to produce a flute quality of tone. Every stop has its individual tone character. Further, some stops are of unison pitch (8-feet stops), some an octave lower, some an octave and some two octaves higher. In the Pedal, the foundation pitch is an octave lower than that of the manual. In most cases an O. has at least two manual keyboards besides Pedal. The lower *manual* is then called the 'Great,' the upper the 'Swell.' In a three-manual instrument the lower is the 'Choir.' In recent years electric action applied to O's has secured many advantages, notably that of a shifting console. Blowing is also now frequently done by electric motor.

ORGANIC CHEMISTRY, see Chemistry.

ORGANIZED RESERVE, see Army: United States.

ORGANON (Gk. = 'instrument'), any system of rules, such as those of Aristotle and Bacon, to assist the mind as an 'instrument' of reasoning.

ORGANOTHERAPY, sometimes called Opotherapy. The treatment of disease by the use of animal glands or organs, or their extracts. Belief in the curative effects of eating particular organs from an animal's body is of very ancient origin, but it is only during the

last half-century that scientific use has been made of the substances found in certain glands, and organs. Among the first to advocate the use of these substances was Brown-Sequard who, in 1869, maintained that each organ of the body had an internal secretion which was its active agent. Many of the extracts advocated by him, however, have been proved valueless, but to him is due the credit of starting a line of investigation which has already had fruitful results. Extracts now in use for medicinal purposes include those from the liver, stomach, pancreas, thyroid, thymus, suprarenal, pituitary and sexual organs. The most widely used are the extracts of the thyroid and suprarenal glands, and the digestive ferments pepsin and pancreatin. The use of thyroid extract has rendered it possible to relieve and even cure myxoedema and cretinism, two diseases previously considered incurable. The extract of the suprarenal gland, known as adrenalin, is used to check hemorrhage, to reduce inflammation and to stop discharges of the mucous membranes. Extract of the pituitary glands influence the growth of bone and fat. Organotherapy is still in the experimental stage, and much success is anticipated as it becomes better understood.

ORIENTATION, in architecture, is the placing of a church so as to have the chancel pointing to the east. The term is also used for the eastward turning of worshippers.

ORIENTE (2° S., 77° W.), province, Ecuador, E. of the Andes; capital, Archidona. Pop., 80,000.

ORIFLAMME (Med. Lat.; *auriflamma*), the red flag of the Abbey of St. Denis, which the kings of France received from the abbot on their consecration. It was at first used only against infidels, but later was in general use.

ORIGEN (185-254 A. D.), Christian theologian who has left as great a mark on Christian dogma as any; *b.* at Alexandria; studied in the catechetical school, a leading seat of theological speculation; became head of the school, 203. He devoted himself diligently to the study of philosophy and Scripture; spent most of his time in Alexandria till 231, though he journeyed in Syria and elsewhere; ordained priest, 230, but a dispute arose, and he was deprived of his order. The remainder of his life he spent mostly in Palestine. His writings were very voluminous, but only a small part of them have been preserved—some in the original, some in Rufinus' Latin translation. Of his correspondence very little has been preserved. His *Hexapla*, or editions of the Gk. versions of the Old Testament, is preserved in part.

ORIGIN OF SPECIES. See Evolution.

ORIHUELA (38° 5′ N., 0° 57′ W.), town, on Segura, Alicante, Spain; textiles. Pop., 30,000.

ORILLIA (44° 36′ N., 79° 26′ W.), town, summer resort, on Lake Couchiching, Ontario, Canada; saw-mills; iron foundries. Pop., 5,000.

ORINOCO (9° 30′ N., 61° 40′ W.), river, N. of S. America; rises in Sierra Parima and flows through Venezuela into Atlantic Ocean; over 1,500 miles long; flows through densely wooded and hilly region, and forms delta *c.* 120 miles from sea; principal tributaries, Apure, Meta, Guaviare, Ventuari, Caura, and Caroni; chief port, Bolivar. O. was explored first by Ordaz, 1531.

ORIOLES, ORIOLIDÆ, family of passerine birds, with brilliant yellow plumage.

ORION (classical myth.), a great hunter who presumed to love the goddess Artemis, for which audacity she slew him; afterwards he was placed among the stars.

ORION. The most brilliant and interesting of the constellations; contains three splendid stars, Rigel (magnitude 0·3), Betelgeuse (0·9), Bellatrix (1·9), and fourty-four stars between magnitudes 4 to 5·2.

ORISKANY, BATTLE OF, a battle of the American Revolution, fought near Oriskany, N. Y., on August 6, 1777. It was one of the most fiercely contested and bloodiest battles of the Revolution. The forces engaged included 800 American militia under General Herkimer and about the same number of Indians and Tories under Sir John Johnson and Joseph Brant. The Americans had for their objective the relief of Fort Stanwicks, which was besieged by General St. Leger and the Indians under Brant. The forces came in contact in a ravine near Oriskany and a desperate battle followed for several hours following. Each side lost heavily but the Americans remained in control of the field. General Herkimer was mortally wounded in this battle.

ORISSA (20° 30′ N., 86° 20′ E.), former kingdom, India; was great center of Buddhism, afterwards of Hinduism; now a division of Bihar and Orissa (*q.v.*); total area, 13,770 sq. miles. Pop.,

5,000,000. Orissa has a number of tributary states.

ORISTANO (39° 54′ N., 8° 36′ E.), town, Sardinia; seat of archbishopric; has cathedral dating in part from XII. cent. Pop. 7,500.

ORIZABA.—(1) (18° 39′ N., 97° 8′ W.), town, Vera Cruz, Mexico; sugar, tobacco. Pop. 36,000. (2) (19° N., 97° 15′ W.), volcanic peak, 18,314 ft.; highest mountain in Mexico.

ORKNEY ISLANDS, are separated from Caithness by the Pentland Firth, lie between 58° 41′ 24″ and 59° 23′ 2″ N. lat. and between 2° 22′ 2″ and 3° 25′ 10″ W. long.; and are seventy-three in number at low-water, of which twenty-eight, besides Pomona, or the Mainland, are inhabited. The area of the O. I. is 376 sq. m. The surface is very irregular, and the land is indented by numerous arms of the sea. The most important of the islands are N. and S. Ronaldshay, Hoy, Ronsay, Stronsay, Flotta, Shapinsay, Eday, and Sanday. See Map of British Isles.

ORLANDO, a city of Florida, in Orange co., of which it is the county seat. It is a favorite winter resort and is famous for its hunting and fishing. It is also the chief trade center for an important fruit growing region. Pop. 1920, 9,282.

ORLANDO, VITTORIO EMANUELE (1860), Ital. statesman and jurist; *b.* Sicily. In 1916 he became minister of the interior in Boselli's cabinet. Succeeded Boselli as prime minister, 1917, and proved a tower of strength at time of Cadorna's disastrous defeat at Caporetto, by stiffening the national resistance, and in a series of patriotic speeches sustained the nation in the face of danger. In the Inter-Allied Peace Conference in Paris, 1919, he was one of the 'Big Four,' on whose decisions all matters of supreme importance were final. His inability to settle the Fiume question at Paris brought about the fall of his ministry, June 1919.

ORLEANAIS, ancient prov., France; capital, Orleans; now mainly included in departments Loiret, Eure-et-Loir, and Loir-et-Cher.

ORLEANISTS, members of Fr. party, led by house of Orleans, seeking to establish constitutional monarchy in France. When opposition to elder branch of house of Bourbon revived after Restoration, house of Orleans stood out as candidate for rule; Louis Philippe, who became king, 1830, united hereditary and elective claim; dynasty overthrown, 1848, but again acquired political significance as alternative to despotism or republic under Second Empire; surrendered claim to Legitimists, 1873.

ORLEANS (47° 54′ N., 1° 55′ E.), city, cap. Loiret, France, on riv. Loire; commercial center; manufactures include blankets, cottons, machinery, agricultural implements, tobacco, preserved vegetables; trade in wine, grain, wool, oil, live stock; with fine cathedral, Ste. Croix (III. cent. onwards), St. Aignan, St. Euxerte, St. Pierre-le-Puellier (X. cent. onwards); Hôtel-de-Ville, 1530, with picture and sculpture gallery, and natural history museum; palais de justice; episc. palace; Hotel-Dieu (hospital); houses of Joan of Arc (Maid of Orleans), Agnes Sorel, and Diane of Poitiers; equestrian statue of Joan of Arc. The Celtic *Genabum* destroyed by Cæsar, Oleans was renamed *Civitas Aureliani* by the Romans, A.D. 272; besieged by Attila, 451; sacked by Northmen, 855, 865; dukedom of Orleans held by Fr. royal family, XIV. cent. onwards; siege of English raised by Joan of Arc, 1429; a stronghold of Protestantism in XIV. cent.; taken by Germans in Franco-German War, 1870, and retained until end of war. Pop. 1921, 69,048.

ORLEANS, CHARLES, DUKE OF (1391-1465), Fr. prince; nephew of Charles VI. and *f.* of Louis XII. of France; taken prisoner at *Agincourt*, 1415, and kept captive in England till 1440.

ORLEANS, LOUIS PHILIPPE JOSEPH, DUKE OF, 'PHILIPPE EGALITÉ' (1747-93), Fr. prince; *f.* of Louis Philippe I.; initiated connection of house of Orleans with constitutionalism; led outrageous private life, but inspired popular criticism of court before Revolution; member of 'Mountain' in National Convention, and voted death of king, his cousin; inevitably mistrusted, and included in general proscription of Bourbons; arrested by Committee of Public Safety; sentenced by Revolutionary Tribunal; executed.

ORLEANS, LOUIS PHILIPPE ROBERT, DUKE OF (1869), head of Fr. Orleanists; went to France at Bourbon recall, 1871; exiled with his *f.*, the Comte de Paris, 1886.

ORLEANS, PHILIP II., DUKE OF (1674-1723), Fr. statesman; seized regency on death of Louis XIV., 1715; Prime Minister, 1723; distinguished soldier and able administrator, but immoral and corrupt.

ORLOV, ORLOFF, noble Russ. family; founded by Ivan, who saved himself from execution by bold reply to Peter the Great, 1689. Grandson, Grigorii, 1734-83, favorite of Catherine II., and commander-in-chief, was cr. count, 1762, Roman prince, 1772; bro's, Alexis, 1737-1808, and Fedor, 1741-96, famous admirals and generals; Fedor's five illegitimate sons were ennobled and allowed name of O. Of this line Alexis, ambassador, was made prince, 1856; son, Prince Nikolai, 1827-85, diplomatist and author.

ORM, ORMIN (fl. XIII. cent.), Eng. author; wrote a book of metrical homilies in the Midland dialect and called by himself the *Ormulum*.

ORMOC (11° N., 124° 40′ E.), town, W. coast of Leyte, Philippine Islands.

ORMUZ, OR HORMUZ, a tn. on the N. coast of an island (Jerun) in the Strait of Ormuz, at the entrance to the Persian Gulf. The town of O. once flourished as one of the wealthiest cities of the East. The Portuguese held it from 1507 until 1622, when the British took it. The town is now decayed, its harbor silted up, and its trade transferred to Bender Abbas.

ORNE (48° 40′ N.; 0°), department, N.W. France; formed of part of Normandy (*q.v.*), Alençon, and Perche; area, 2,354 sq. miles; large forests; fine agriculture and pasture land; chief river, Orne; capital, Alençon; iron-wares, lace, linen, cider, horses, etc. Pop. 1921, 274,814.

ORNES (49° 14′ N.; 5° 31′ E.), vil., Meuse, France, 8 m. N.E. of Verdun; formed the pivot of Fr. defense at the beginning of the battle of Verdun, Feb. 24, 1916; in woods behind the Twins of Ornes, two heights N.E. of the vil., the Germans concentrated a great mass of artillery. See VERDUN, BATTLE OF.

ORNITHOLOGY (Gr. *ornis*, 'a bird'; *logos*, 'science'), the branch of zoology which deals with birds and bird life. It is concerned with one of the most familiar and largest of vertebrate classes, remarkable for the diversity and unified perfection of its organs, and containing more than 12,000 species.

Birds are feathered creatures—a sure guide to their identity, for no bird is without *feathers*, and no other creature possesses them. To birds the feathers are of the utmost importance, for not only do they form a light coat suitable for a creature which has conquered the air, but their conservation of warmth enables the body to be kept at the uniformly high temperature (sometimes as much as 112° F.) which is an index of a bird's extraordinary metabolism and activity. So they have helped in the conquering of climate, for wherever food is to be found, there birds occur irrespective of cold, from Artic to Antartic. Feathers, however, are not uniformly sprinkled over the body, but, with a few exceptions, are confined to definite feather tracts, or *pterylia*, which differ in position in different birds. In the feathers reside the distinctive colors, and these may be due to fine striations which disperse the light rays giving metallic colors, or to deposition of actual pigment, which is sometimes so soluble that, in the Turacos for exampie, it washes out when the birds bathe.

Birds are, again, predominantly flying creatures, only a few, such as the extinct great auk, the burrowing parrot (*Stringops*), the penguins, and the running birds, having almost or altogether lost the power of fight. And with this habit many of the peculiarities of bird structure are associated (see FLIGHT). The wings are moved by exceedingly strong breast muscles attached at the lower end to a ridge, the keel, on the front of the breastbone or sternum. As a rule, the stronger the muscles and the flight of a bird the larger the keel, which is altogether absent from the flightless running birds.

The *food* of birds and their feeding habits are of great interest, especially as these are generally correlated with adapted structures in beak, claws, and food tract. Many species confine themselves to a diet of grain and seeds, and these, such as the finches, have short stout beaks with splitting edges, large storing crops, and grinding gizzards; but the latter structures are small and the beak slender in such as feed on worms, insects, and the like. An almost abnormal food habit is exhibited by the honey-sipping humming birds. In such tree-inhabiting species the feet are formed on the same plan, the toes being long, supple, and separate, suited for clinging to branches, and armed with moderate claws. In the birds of prey the claws become hooked talons and the beak curved and strong—fit structures to grasp and tear active living prey such as birds and mammals. Of birds which find their food on the seashore or in streams, the majority have long, unfeathered wading legs and swimming feet. But the latter may be completely webbed to the tip of the toes (as in ducks) half-webbed (as in the avocet), or having separate toes margined with a simple or lobed membrane (grebe and coot). The aquatic birds also present the greatest variety of beak structure, each type adapted to a special requirement. The

avocet, curlew, and many others, which pick dainties from deep in mud, have extremely long, slender bills; the spoonbill dabbles in mud with its curious beak for insects, larvæ, molluscs, and worms; ducks for the same end sift the same material through the plates bordering their bills; fish-eating birds have beaks curved at the tip to retain their slippery prey; the pelican stores its catch in a large dilatable sack attached to its lower jaw. In all such birds the mechanical gizzard and crop are reduced in favor of purely digestive apparatus.

The *development* of birds—from egg, through chick, to adult—is familiar, but two great divergences may be mentioned. Some young are hatched equipped for an immediate start in life—*e.g.*, the young of the farmyard fowl, such being known as *Præcoces*; while the majority leave the egg naked and blind, and have to be fed until they can use their own wings—*e.g.*, the blackbird, robin, etc., these being known as *Altrices*. The young are covered with moderately simple down feathers, and often pass through several stages of plumage before the adult coloration is attained. It is a curious and unique fact that two distinct down stages, a white and a dusky brown, occurs in a species of penguin.

Birds as a class enter greatly into human economy. They are amongst the comparatively few creatures which man has been able to *domesticate*: their flesh is eaten, their eggs form an invaluable source of nourishment, the nests of the Eastern edible swifts are made into soup, the oil bird of America furnishes oil and 'butter.' Apart from their food value they have been put to little direct use by man, but trained pelicans catch fish for their Chinese owners. Many species are the objects of sport, as the game birds, or the agents of sport, as the hawking falcons; the plumage of others is esteemed by some as ornament; and the agelong accumulations of the food-refuse and excrement of seabirds form the invaluable Guano deposits of a few tropical islands. But the most beneficent work of birds towards man is indirect; for, although some destroy fruit and grain, these depredations are more than over-balanced by the unsparing war waged by birds upon destructive insects, insect larvæ, and vermin.

Birds fall into two sub-classes: I. Archæornithes—Extinct Birds, such as the tailed *Archæopteryx*.

Sub-class II. Neornithes—including the divisions of (1) Ratitæ or Running Birds; (2) the extinct Toothed Birds or Odontornithes; and (3) the Keeled Birds or Carinatæ, which include almost all living forms. The latter were once conveniently, if roughly, divided by their predominant habits into Swimmers (*Natatores*), Waders (*Grallatores*), Gallinaceous Birds or Scratchers (*Rasores*), Birds of Prey (*Raptores*), Climbers (*Scansores*), and Perchers (*Insessores*), the last two groups in part containing the Picarian Birds, characterized by their habits of building nests and laying white eggs at the bottom of excavations in trees, stems, or in the ground. Present classifications group existing Carinate Birds in about thirty more or less distinct orders, separated into four divisions according to the minute arrangement of the palatal bones of the skull.

ORNITHORHYNCUS.—Also known as the Duck-bill, Duck-mole or Duck-billed platypus. A small mammal occurring in Australia, New Guinea and New Zealand. They live in burrows in the banks of rivers and creeks and are semi-aquatic. They possess many physical peculiarities, which render them somewhat of a curiosity. Although the animals are mammals, the young are hatched from eggs. The latter are about three-quarters of an inch in length, and have a white shell. The young are hatched almost immediately the egg is laid, and are naked and blind. The mother has no teats, but her milk exudes over a patch of bare skin, from which it is lapped by the young. The adult animal grows to a length of about twenty inches, is covered with fur and has webbed feet. In order to permit the front legs to be used for burrowing, the web can be folded back so as to expose the claws. The muzzle is broad and flat, and closely resembles the bill of a duck. The young ornithorhyncus possesses teeth, but they soon disappear, and the adult animal masticates its food by means of four pairs of horny plates, two on each jaw. The animal lives partly in the water and partly on land. It obtains its food by burrowing into the mud at the bottom of streams and rivers, where it finds worms, and various small aquatic insects and fish, but the nest, where the eggs are laid and the young tended, exists at the end of a long burrow in the bank of a stream.

ORNSTEIN, LEO (1895), pianist and composer; b. Krementchug, Russia. He was a pupil at the Imperial Conservatory of Music, Petrograd, at nine, and three years later came to the United States. His first appearance was at a New York concert in 1911, after which he became of note as a soloist at numerous concerts of the New York, Boston, Philadelphia, Chicago and St. Louis orchestras. He made concert tours of the United States, Canada, Norway and Sweden, and also played in London and

Paris. His compositions include pieces for the orchestra, piano and violin and songs.

ORONTES (35° N., 36° 50′ E.), chief river, Syria; falls into Mediterranean; modern Nahr-el-Asi.

OROPUS (38° 18′ N., 23° 49′ E.), ancient seaport, on Euripus, Attica, Greece.

ORPHEUS (classical myth.), Gk. hero; *s.* of Apollo and Calliope (according to principal legend); *b.* in Thrace; journeyed with Argonauts, and by his lyre, given by Apollo, delivered companions from dangers; able to charm animate and inanimate objects with his music. On death of his wife Eurydice, O. descended to Hades to rescue her, but lost her by disobeying orders and looking back to see if she was following him. There are diverse legends concerning his death; killed by Zeus, or torn in pieces by Mænads, women of Thrace. Myth was probably woven round some hist. sacred Thracian bard.

ORPHIC BROTHERHOOD consisted of number of ascetics in some ways akin to Pythagoreans; flourished in later Rom. Empire.

ORPHIC POETRY consists of fragments of verse older than Homeric and Hesiodic poems.

ORPINGTON (51° 22′ N., 0° 6′ E.), town, Kent, England. Pop. 16,000.

ORRERY, ROGER BOYLE, FIRST EARL OF (1621-79), cr. baron of Broghill, 1627; fought for Charles I. in Ireland, but accepted commission from Cromwell, and helped to subdue Ireland; secured Ireland for Charles II. at Restoration; wise statesman and voluminous, not always dull, writer.

ORRIS ROOT, the rhizome of *Iris florentina,* a violet-scented plant occurring in S. Europe. A starch or flour is prepared from the rhizome for use in the manufacture of toilet powders, especially dentifrices. The plant is cultivated for the purpose in the N. of Italy, and is sometimes grown in British gardens.

ORSEOLE I., PIETRO, Doge of Venice, 971-91; founded new Church of St. Mark and bought Pala d'Oro; philanthropist. Orseole II., Pietro, Doge of Venice, 991-1008; won naval victories, 998, originated yearly custom of wedding the sea. Orseole III., Doge of Venice, 1008-26; increased power of state, but was banished by republicans.

ORSINI, celebrated Ital. family; Rom. branch produced Popes Celestin III., Nicholas III., Benedict XIII., and famous Ital. nobles; in Papal States O. were great enemies of Ghibelline Colonnas.

ORSINI, FELICE (1819-58), Ital. patriot; fought in War of Independence, 1848; worked with Mazzini till imprisoned, 1854; pub. *Austrian Dungeons in Italy, 1857*; executed in Paris after throwing bomb at Napoleon III.

ORTA, LAKE OF (45° 50′ N., 8° 23′ E.), lake, Novara, Italy; length, 7½ miles.

ORTELIUS, ABRAHAM (1527-98), geographer, of Ger. parentage; *b.* at Antwerp; pub. the first atlas (*Theatrum Orbis Terrarum*) and critical works on ancient and modern geography.

ORTH, SAMUEL PETER (1873-1923), lawyer; *b.* at Capac, Michigan. In 1896 graduated from Oberlin College. 1897-1902 professor of political and social science at Buchtel College and at the Western Reserve University, Case School of Applied Science and Oberlin College, 1904-1906 as lecturer on international law, economics and political science. Was president of the Board of Education, Cleveland, from 1904-1905 and since 1905 Assistant United States Attorney. Author of: *Centralization of Administration in Ohio, 1903*; *Five American Politicians, 1903*; *A History of Cleveland, 1909-1910.* Wrote for professional and literary magazines.

ORTHEZ (43° 31′ N., 0° 47′ W.), town, Basses-Pyrénées, France, on Gave de Pau; cotton fabrics. Pop. 6,400.

ORTHOCLASE, or common felspar, consists of silicate of aluminum and potassium; white, green, and transparent; an important rock-forming mineral.

ORTHODOXY (literally, right opinion), a correct belief, especially in religious doctrine, but also in philosophical, social, or political principles. Belief not orthodox, but not too inimical, is *heterodoxy*; while denial or holding incompatible opinions is *heresy.* Each religion or sect naturally has its own O., which may vary in different periods of its history. The term may be applied in general to beliefs consistent with the Scriptures, but each religion or sect usually formulates its own dogma in creeds or by reference to the teachings of founders or prominent teachers. Belief in the Thirty-nine Articles constitutes O. in the Anglican Church. The Greek or Eastern Church is often referred to as the Orthodox Church.

ORTHOGRAPHY. See SPELLING.

ORTHOPTERA (Gk. *orthos,* straight; *pteron,* a wing), an order of insects which

includes earwigs, cockroaches, mantidæ or praying-insects, stick- and leaf-insects, grasshoppers, locusts, and crickets. These possess the common characters that the young reach maturity by a series of slight changes or moults, from three to six in number, instead of by a violent metamorphosis as in most other insects.

ORTIGUEIRA (43° 40′ N., 8° W.), seaport, Corunna, Spain. Pop. 19,000.

ORTLER SPITZE (46° 30′ N., 10° 34′ E.), highest mountain, Austrian Tyrol, 12,800 ft.

ORTONA-A-MARE (42° 21′ N., 14° 26′ E.), seaport, Chieti, Italy; cathedral. Pop. 15,500.

ORURO.—(1) (*c.* 18° 10′ S., 67° 30′ W.), dept., Bolivia; area, 19,000 sq. miles; produces tin. Pop. 141,000. (2) (17° 55′ S., 66° 50′ W.), capital of above; has gold, silver, and tin mines. Pop. 32,000.

ORVIETO (42° 43′ N., 12° 6′ E.), city, Italy, on Paglia, in province Perugia; situated on isolated rock, 640 ft. high. O. was ancient *Volsinii*, later *Urbs Vetus*; passed to popes *c.* X. cent.; first *podesta* elected, 1199; became part of kingdom of Italy, 1860. Pop. 18,300.

O'RYAN, JOHN F., (1874), an American lawyer and soldier, *b.* at New York City, *s.* of Francis and Anna Barry O'Ryan. He was educated at the College of the City of New York and at New York University and graduated from the Army War College in 1914. After being admitted to the New York bar in 1898 he was engaged in the practice of law as a member of the firm of Corbin & O'Ryan. He enlisted in the Y. N. G. in 1897 and after advancing through various grades he was made a major-general in 1912. In 1916 he commanded the New York Division on the Mexican border, was appointed a major-general National Army by President Wilson in 1917 and from then until 1919 was in command of the 27th Div. (N.Y.) in France and Belgium.

ORYX, a genus of African antelopes, with maned neck, long, straight horns, and long tail. The Gemsbok and Beisa are two common species.

OSAGE, a riv. of U.S.A., rises in S.E. of Kansas as the Marais des Cygnes. Entering the state of Missouri on the S.W., it flows E.N.E., and bearing N.E. it enters the Missouri R., joining it on the r. b., 10 m. from Jefferson City. Length 494 m.

OSAGE ORANGE (*Maclura aurantiaca*), a hardy deciduous tree, native of N. America. It is usually spiny, and bears entire or serrated shiny leaves and small yellow or green flowers, which are followed by large golden fruits, filled with a fœtid slime.

OSAKA, OZAKA (34° 40′ N., 135° 32′ E.), seaport, Japan, on Yodogawa; cotton-mills; ironworks. Pop. 1920, 1,252,972.

OSBORN, HENRY FAIRFIELD (1857), an American paleontologist, *b.* at Fairfield, Conn., *s.* of William Henry and Virginia Reed Sturges Osborne. He graduated from Princeton University in 1877. After being an instructor at Princeton from 1881-90 he became connected with Columbia University in 1891 and after being professor of biology and later zoology he became research professor of zoology there in 1910. He was also honorary curator of the American Museum of Natural History of which he was president of the trustees from 1908-; vertebrate paleontologist of the U. S. Geol. Survey from 1900-, and an elector of the Hall of Fame from 1910-, in addition to which he was a member of a great many scientific societies both in America and abroad, and was presented with several medals and awards. He wrote numerous scientific and educational papers and was the author of *Origin and Evolution of Life, 1917*, and others.

OSBORN, HENRY STAFFORD (1823-1894), an American educator, *b.* in Philadelphia, Pennsylvania. In 1841 he was graduated from the University of Pennsylvania. From 1866-1870 at Lafayette College, professor of mining and metallurgy, and held the same chair until 1873 at Miami University. Author of: *Palestine, Past and Present, 1855*; *Pilgrims in the Holy Land, 1857*; *Scientific Metallurgy of Iron and Steel in the United States, 1870*; *Biblical History and Geography, 1888.*

OSBORN, HERBERT (1856), an American biologist, *b.* at Lafayette, Wis., *s.* of Charles Paine and Harriet Newell Marsh Osborne. He was educated at Iowa State College. After being professor of zoology at Iowa State College he became connected with Ohio State University in 1898 of which he was made research professor in 1916-. He was also made director of the Ohio Biological Survey in 1912-, and consulting entomologist of the Maine Experimental Station in 1913-. Author: *Insects Affecting Domestic Animals, 1896*; *The Hessian Fly in the United States, 1898*; *The Genus Scaphoideus, 1900*; *Economic Zoology, 1908*, and *Economic Entomology. 1916*; also many papers in journals.

OSBORNE, THOMAS MOTT (1859), an American penologist, *b.* at Auburn, N. Y., *s.* of David Munson and Eliza Wright Osborne. He graduated from Harvard in 1884. After holding various political positions including, Mayor of Auburn, 1903-5, and chairman of the New York Commission on Prison Reform in 1913, he was appointed warden of Sing Sing Prison and assumed charge in 1914. In 1915 he was indicted for alleged mismanagement, but the case was dismissed upon trial and he was reinstated as warden, however he resigned the following year. From 1917-20 he was in command of the Naval Prison, at Portsmouth, N. H., from which he was relieved at his own request. Author: *Within Prison Walls, 1914*, and *Society and Prisons, 1916*.

OSBORNE, WILLIAM HAMILTON (1873), an American lawyer and author, *b.* at Newark, N. J., *s.* of Joseph P. and Kate Hamilton Osborne. He was educated at Newark High School and at New York Law School. He was admitted to the bars of New York and New Jersey in 1894 and was afterwards engaged in the practice of law in those states. In addition to contributing short stories to the Saturday Evening Post and other leading magazines, he was the author of: *The Red Mouse, 1909*; *The Running Fight, 1910*; *Satspaw, 1911*; *Blue Buckle, 1914*; *Boomerang, 1915*; also the moving picture serial *Neal of the Navy, 1915*, and *How to Make Your Will, 1917*.

OSBOURNE, LLOYD (1868), an American writer, *b.* in San Francisco, California. He studied engineering at the University of Edinburg. Appointed vice-counsul to Samoa from the United States. He wrote (with Stevenson): *The Wrong Box, 1889*; *The Wrecker, 1892*; *Ebb Tide, 1894*. He published in 1906, *Three Speeds Forward and Wild Justice*.

OSCA LINGUA, the language of an ancient Ital. people of Campania and Samnium. The Oscan language does not differ substantially from Latin, but is a cruder and more primitive form of it.

OSCAR I. (1799-1859), king of Sweden and Norway; succ. his *f.*, Charles XIV., 1844; showed thorough knowledge of finance; successfully negotiated alliances to prevent Russ. aggression.

OSCAR II. (1829-1907), Sweden and Norway, 1872-1905, of Sweden, 1905-7; *s.* of Oscar I.; a gifted writer; separation of Norway and Sweden in his reign was due to no fault of sovereign.

OSCEOLA (1804-1838), Seminole Indian chief; *b.* southwestern Georgia; *d.* Fort Moultrie. He was supposed to be partly of English blood on the paternal side. His mother, an Indian woman, took him to Florida as a child, and there he won the friendship of the Seminoles, whose chief he became in their opposition to the government sale of their lands. In 1838 his wife, the daughter of a fugitive slave, was captured at Fort King and carried into slavery, whereupon he threatened the government agent, who put him in irons for a week. A few months later he and his men started the second Seminole war by killing the agent and also a major and 110 soldiers. They took refuge in the Everglades, where the warfare was kept up till 1837. He was finally captured under a flag of truce, to whose protection he had trusted while conferring with General Thomas Jesup.

OSCHATZ (51° 19′ N., 13° 7′ E.), town, on Döllnitz, Saxony; sugar. Pop. 11,000.

OSCHERSLEBEN (52° 3′ N., 11° 13′ E.), town, on Bode, Prussian Saxony, Germany; sugar. Pop. 13,000.

OSCILLOGRAPH, an electrical instrument used to record the alternations of an electric current. Two delicate phosphor-bronze strips lie stretched vertically between the poles of a magnet. When a current passes, one strip moves back and the other forward, thus turning an attached mirror which, by reflecting a spot of light on to photographically prepared paper moved by clockwork, records the motion.

OSH (40° 43′ N., 72° 35′ E.), town, Ferghana, Asiatic Russia. Pop. 45,000.

O'SHAUGHNESSY, ARTHUR WILLIAM EDGAR (1844-81), Eng. poet; wrote *Epic of Women, 1870*; *Lays of France, 1872*; *Music and Moonlight, 1874*; charming sonneteer and lyrist.

O'SHAUGHNESSY, EDITH COUES (Mrs. Nelson O'Shaughnessy), an American author, *b.* at Columbia, S. C., *dau.* of Elliott and Jeanie Augusta McKinney Coues. She was educated under private tutors and at the Convent of Notre Dame, Md. She was married at Rome, Italy, to Nelson O'Shaughnessy (diplomat) of New York, in 1901. Author: *A Diplomat's Wife in Mexico, 1916*; *Diplomatic Ways in Mexico, 1917*; *My Lorraine Journal, 1918*, and *Intimate Pages of Mexican History, 1920*.

OSHAWA (43° 50′ N., 78° 50′ W.), town, Ontario, Canada, on Lake Ontario; flour mills; canneries. Pop. 5,300.

O'SHEA, MICHAEL VINCENT (1866), an American university pro-

fessor, *b.* at Le Roy, N. Y., *s.* of Michael and Margaret Fitzgerald O'Shea. He was educated at Cornell University. He was professor of psychology and education at the State Normal School, Mankato, Minn., from 1892-5 and professor at the Teachers College, Buffalo, 1895-7 after which he was professor of education at the University of Wisconsin. Author: *Suggestions for the Observation and Study of Children, 1894*; *Mental Development and Education, First Steps in Child Training, Faults of Childhood and Youth, Every-day Problems in Child Training*, all in 1920 and was editor-in-chief of the World Book Encyclopedia.

OSHIMA (28° 20′ N., 129° 20′ E.), small island, Japan; has an active volcano.

OSHKOSH, a city of Wisconsin, in Winnebago co., of which it is the county seat. It is on the Minneapolis, St. Paul and Salt Ste. Marie, the Chicago and Northwestern, and other railroads, and on the Fox river. Its industries include lumbering and the manufacturing of carriages, wagons, machinery, tobacco, flour, etc., and it has also large meat packing establishments. It is the seat of several State institutions and has a court house, city hall, U. S. government building and a public library. Pop. 1920, 33,163.

OSIER (*Salix viminalis*), species of willow from whose twigs baskets are made; grown in what are termed O. beds along low-lying flanks of water courses, or on land subject to periodic inundation; raised from cuttings about a foot and a half long, of vigorous two-year-old shoots which strike root very readily.

OSIMO (43° 30′ N., 13° 29′ E.), town, Ancona, Italy; ancient *Auximum*; silk industries. Pop. 18,500.

OSIRIS, see EGYPT (RELIGION.)

OSKALOOSA, a city of Iowa, in Mahaska co., of which it is the county seat. It is on the Chicago, Rock Island and Pacific, the Burlington and other railroads, and between the Des Moines and Keokuk rivers. It is the center of an extensive coal region and nearby are also mines of iron and deposits of limestone and fire clay. Its manufactures include iron and brass goods, iron furnaces, woolen goods, and flour mills. It is the seat of Oskaloosa College and Penn College, and has also a business college, public library and other public buildings. Pop. 1920, 9,427.

OSLER, SIR WILLIAM (1849-1919), professor of medicine and author; *b.* Tecumseh, Ontario. He studied at the Toronto School of Medicine and McGill University, from which he obtained the M. D. degree in 1872, and where in 1874 he became professor of physiology and pathology after a course of medical studies in London, Berlin and Vienna. Between 1884 and 1886 he filled the chair of clinical medicine at the University of Pennsylvania, and lectured at the Royal College of Physicians, London, and at the College of Physicians and Surgeons, New York City. He became best known to Americans as professor of medicine at Johns Hopkins University from 1889 to 1904, when he was appointed Regius professor of medicine at Oxford University, England. He wrote a number of important medical works, including *A System of Medicine*, and *Principles and Practice of Medicine*, a standard work. He was created a baronet in 1911.

OSMAN DIGNA (1836-1900), a Turkish general. In 1881 he joined Arabi Pasha in his revolt against the British in the Soudan. After this had been quelled he united with the Mahdi, who appointed him ruler of East Soudan. He won several victories and was said to have been largely responsible for the fate of General Gordon at Khartum, in 1885. In 1900 he was defeated at Tokar and shortly after died.

OSMAN NURI PASHA (1832-1900), a Turkish field marshal. He entered the army in 1853 and fought brilliantly in the Russian War of 1853-1856. His greatest achievement was his gallant defense of Plevna during the Russo-Turkish War in 1877, when he repulsed the Russians with great loss. He was captured on December 9, 1877, but returned to Turkey after the treaty of San Stefano.

OSMIUM.—Os. Atomic weight 190.9. A rare metal belonging to the platinum group. It was first discovered by Tennant in 1804 in the metallic residues obtained when platinum ores were dissolved. It melts at 2500° C. and has a specific gravity of 22.477. It is, therefore, the heaviest substance known and is of interest for that reason and also because it is the least volatile of all metals. It is obtained either as bluish white crystals or as a blue grey powder. It has been used as a filament for electric lamps, but owing to its scarcity it has been replaced, for this purpose, by tungsten.

OSMOSIS.—The passage of water through a membrane caused by solutions of different concentration existing on either side of the membrane. The

membrane may be made of animal tissue or parchment or may be artifically prepared. It is known as 'semi-permeable,' because it permits the passage of water but will not permit the passage of the substance dissolved in the water. If, for instance, a container furnished with a semi-permeable membrane is filled with sugar solution and then lowered into a larger vessel containing water, the water will pass through the membrane and dilute the sugar still further, but no sugar will pass through into the water. Osmotic pressure is produced on the side of the diaphragm where the solution exists, and it is assumed that this pressure is due to the bombardment of the diaphragm by the molecules of the dissolved substance in their efforts to get through. Osmosis obeys certain definite laws, and it was shown by Van't Hoff that these laws are similar to those followed by gases under pressure. Osmosis accounts for various natural phenomena. The rising of sap in plants against the force of gravity, for instance, is due to osmosis, while the action of various drugs in the human body is also accounted for by the same phenomenon.

OSNABRÜCK (52° 17′ N., 8° 3′ E.), town, Hanover, Germany; seat of R. C. bishopric; has episcopal palace and XIII. cent. cathedral; formerly fortified. Pop. 1920, 85,017.

OSORIO, JERONYMO (1506-80), Portug., scholar and divine; bp. of Silves, 1564; wrote hist. and exegetical works in polished Latin.

OSPREY, FISH-HAWK (*Pandion*), forms a genus and family of Birds of Prey found in the Old World and America; feeds on marine and freshwater fishes; all but exterminated from Britain. The so-called 'osprey plumes' are not taken from this bird, but from the egret.

OSRHOENE, OSROENE, region, Mesopotamia; was small kingdom under Abgar dynasty, 137 B.C.-116 A.D.; afterwards came under Rom. control.

OSSA (39° 45′ N., 22° 40′ E.), mountain, Thessaly, ancient Greece; modern Kissovo.

OSSETT (53° 41′ N., 1° 35′ W.), town, Yorkshire, England; woolen mills; collieries. Pop. 1921, 14,802.

OSSIAN (Fawn), a latinized form of the Gaelic Oisin, the name of a semi-mythical Gaelic bard who is claimed by both Scotland and Ireland, and the presumed author of a number of narrative poems of high epic excellence, dealing with the deeds of Finn MacCumhal and Cuchulain. About the middle of the XVIII. cent., James MacPherson, a Scottish tutor, claimed to have discovered and translated these poems, which had existed in the Highlands from time immemorial in oral tradition. He embellished them somewhat in the process of translation, but the fact that they were afterwards taken down from the recital of many aged persons in the Highlands thoroughly disposed of the adverse criticism of Dr. Johnson, who saw in MacPherson's performance nothing but a pure invention.

OSSIFICATION, the formation of bone. As a normal process, it occurs in the development of the human body, and is particularly characteristic of the fœtal and childhood periods. In general the structure is at first represented by cartilage, which is gradually transformed to the harder tissue known as bone. O. sometimes occurs as a morbid process, but more usually the term is incorrectly applied to calcareous deposits having the outward properties, but not the minute structure, of bone.

OSSINING, a village of Westchester co., New York. It is on the New York Central Railroad and on the Hudson River, 30 miles north of New York. Its industries include the manufacture of lime, carriages, steam engines, gas and water pipe, etc. The famous Sing Sing Prison is located here and the name of the village was formerly Sing Sing. It was changed to its present title in 1901. Ossining is on the widest part of the Hudson River and commands a fine view of many interesting points. It has several academies and other public institutions. Pop. 1920, 10,739.

OSSOLI, COUNTESS. See FULLER, MARGARET.

OSTADE, the name of two Dutch painters, brothers, both born at Haarlem. **ADRIAN OSTADE** (1610-85), was a pupil of Franz Hals, and later fell under the influence of Rembrandt's style. He was a prolific painter, and dealt in a vigorous way with scenes and characters of rustic life. **ISAAC OSTADE** (1621-49), painted somewhat similar subjects, favoring winter aspects of the country and village street life.

OSTASHKOV (57° 8′ N., 33° 12′ E.), town, on Lake Seliger, Tver, Russia; leather. Pop., 11,500.

OSTEND, seapt., wat.-pl., W. Flanders, Belgium (51° 14′ N., 2° 56′ E.); modern importance as Belgium's second port is due largely to its being on main passenger route between London and Continent; extensive improvements to inner and outer harbors completed in

1905; headquarters of Belgian fishing fleet; casino; racecourse; fashionable bathing and holiday resort; fisheries, oyster-beds; taken by French (1745 and 1794. Pop., 1921, 48,073.

In the World War Ostend had considerable military and naval importance. The British were anxious to retain it because it offered a jumping-off point for an advance against the Ger. flank. After the fall of Antwerp (Oct. 9) the Belgian and Brit. forces retired along the sea front through Ostend, which was entered by the Germans (Oct. 22). When the fighting settled down to trench warfare, Sir John French was anxious to advance along the coast in co-operation with the navy; but the project was not favored by the French. With the inauguration of the unrestricted submarine campaign Ostend became an important naval position communicating by canal with the Ger. base at Bruges. A daring attempt was made (April 23, 1918) to seal up the port, so as to prevent the egress of U-boats; but though the old cruisers *Sirius* and *Brilliant* were sunk outside the harbor, the channel was not effectively blocked. A second attempt (May 9-10, 1918) resulted in the sinking of *Vindictive* in the harbor. Ostend was finally recovered by the Belgians (Oct. 17, 1918). The Germans had constructed strong defences along the sea front in apprehension of a naval landing. It was frequently bombarded from the sea and bombed from the air.

OSTEND MANIFESTO, the name given in American diplomatic history to a despatch drawn up at Ostend, on October 9, 1854, by the American ministers to Great Britain, France and Spain, who had met to discuss the question of Cuba. The despatch urged the purchase of Cuba by the United States and on Spain's refusal to sell, seizure was advised. The suggestion was not approved.

OSTEOLOGY, the science which treats of the bones. See SKELETON.

OSTEOPATHY, a system of curing and preventing diseases without the use of drugs by controlling the blood, lymph, and nerve forces of the body. It supposes that illness is caused by the misplacement of one of these things, and strives by the manipulation of the bones (which are used as levers on the adjacent nerves and vessels) to adjust the misplaced parts. It was formulated by an American doctor, Andrew T. Still, in 1874. There are now several osteopathic colleges, the first being at Kirksville, Mo. The practice is legalized by most of the states.

OSTERHAUS, HUGO (1851), rear-admiral; *b.* Belleville, Illinois. Graduating from the U. S. Naval Academy in 1870, he became ensign the following year and lieutenant in 1880, rising successively to lieutenant-commander, commander, captain and (1909) rear-admiral. In 1907 he commanded the *Connecticut* and in 1910 the second division of the Atlantic Fleet. He was commander-in-chief of the same fleet in 1911 and retired in 1913.

OSTERHAUS, PETER JOSEPH (1823-1917), German-American army general; *b.* Coblenz, Germany; *d.* Berlin. He immigrated to the United States in 1849 and joined the Union army at the outbreak of the Civil War, as major of a Missouri infantry regiment, becoming brigadier-general of volunteers in 1862. He commanded several divisions during the war, notably in the Vicksburg and Atlanta campaigns, and under Grant at Chattanooga in 1863. In 1865 he commanded the 15th Army Corps (Army of the Tennessee) and after the war had charge of the military district of Mississippi. In 1866 he went to Lyons, France, as U. S. consul, serving as such till 1877. Later he returned to Germany. In 1905 Congress made him brigadier-general, U. S. A.

OSTERMAN, ANDREI IVANOVICH, COUNT (1686-1747), Russ. statesman; held office under Peter the Great, Catherine I. (1725-27), and Peter II. (1727-30); aided Anne Ivanovna to establish her rule, 1730; banished, 1741.

OSTERODE (1) (51° 44′ N., 10° 14′ E.), town, Hanover, Prussia, in Harz Mountains; cottons, woolens. Pop., 7,500. (2) (53° 41′ N., 19° 57′ E.), town, on Lake Drewenz, E. Prussia province, Prussia; machinery. Pop., 14,000.

OSTERSUND (63° 6′ N.; 14° 42′ E.), town, Jemtland, Sweden, on Storsjö; tanneries. Pop., 1921, 13,405.

OSTIA, ancient town of Latium in Italy, situated at mouth of Tiber, 14 miles from Rome; harbor for long was considered one of best in central Italy; O. became prominent with growth of Rome, and rose to be a trading port of great commercial importance; after construction of safer and larger harbors by Claudius and Trajan, O. began to lose its importance. Excavations began in XVIII. cent.; ruins, which are extensive and well preserved, include forum, temples, warehouses, and barracks; modern village of O. exists near site.

OSTIAKS, Finnish people of Siberia; towns, destroyed by Russians, 1501.

still to be traced round Obdorsk; barbarians, and rapidly dying out.

OSTRACISM (Gk. *ostrakizein*, earthen tablet), judicial expedient of ancient Greece. Citizens not liable to process at common law but dangerous to state were banished, after ballot in which names of proscribed were written on earthen tablets; said to have been introduced into Athens by Cleisthenes, 508 B. C. Leaves being used at Syracuse, system was called *petalism*.

OSTRACODERMS (Gk. *ostracon*, a shell; *dermos*, skin), or **HYPOSTOMATA**, extinct primitive fishes without jaws and without a backbone, but with complicated protecting shields; the oldest known vertebrates, found in Silurian and Devonian rocks.

OSTRAU, MÄHRISCH- (48° 59′ N., 17° 23′ E.), town, on Ostrawitza, Moravia, Austria; collieries; ironworks. Pop., 37,000. *Polnish-Ostrau* is a commune in Silesia, Austria.

OSTRICH, see under RUNNING BIRDS.

OSTROG (50° 21′ N., 26° 31′ E.), town, Volhynia, Russia; tanneries. Pop., 15,700.

OSTROGOTHS, see GOTHS.

OSTROLENKA, tn. and fortress, Poland (53° 4′ N., 21° 39′ E.), 21 m. W. S. W. of Lomza, on l. bk. of Narev; scene of decisive defeat of the Poles by the Russians (May 26, 1831); captured in Ger. advance on Warsaw from the north (Aug. 1915). Pop., 9,000.

OSUNA (37° 16′ N., 5° 7′ W.), town, Seville, Spain; grain, fruit. Pop., 18,000.

OSUNA, PEDRO TELLEZ GIRON, DUKE OF (1575-1624), Span. noble, called 'the great duke'; Viceroy of Sicily, 1610-16; of Naples, 1616-20.

OSWALD (*d.* 992), Eng. cleric; bp. of Worcester, 961; abp. of York, 972.

OSWALDTWISTLE (53° 45′ N., 2° 23′ W.), town, Lancashire, England; cotton-mills. Pop., 16,000.

OSWEGO, a city of New York, in Oswego co., of which it is the county seat. It is on the New York, Ontario and Western, the Lackawanna and the New York Central railroads, and on the Oswego river and Oswego canal. It is the terminus of the New York State Barge Canal. The city has two harbors, one at the mouth of the river and the other on Lake Ontario. It is an important industrial city and has manufactures of boilers and engines, tools, pumps, automobile parts, watches, etc. It has regular steamboat connection with the cities on the Great Lakes. Its public institutions include a State Normal School, U. S. government building, public library, hospital, etc. Pop., 1920, 23,626.

OTAGO, a provincial dist. of New Zealand, South Island, situated to the S. of the provincial districts Canterbury and Westland. It was one of the six original divisions of the colony, which since 1876 have been abolished and the county system adopted. The mountains run from N.W. to S. E., the chief ranges being the Barrier Mts., the Kakanui Range, the Crown Mts., the Hector Mts., Richardson Mts., Eyre Mts., Aika Mts., Livingstone Mts., and Takitimu Mts. Among industries may be mentioned the rearing of live stock, arable agriculture, and mining; the principal crops being wheat, oats, and barley, as well as all sorts of vegetables and fruits. Gold occurs in large quantities, and also coal, hewn stone, and slates. The capital is Dunedin, which is picturesquely situated on the southwestern side of Otago Harbor. It was founded in 1848 by members of the Free Church of Scotland, and owes its prosperity to the gold mining of O. It is the most important commercial center in New Zealand, and is the seat of one of the chief colleges in New Zealand University, and the principal school of mines. Pop. 200,000.

OTAHEITE, see TAHITI.

OTHO. See OTTO.

OTHO, MARCUS SALVIUS (32-69); Rom. emperor; app. gov. of Lusitania, 58, by Nero, formerly his boon companion, but now anxious to obtain his wife, Poppea; aided insurrection of Galba, 68; revolted, 69, and with aid of prætorians became emperor; attacked by Ger. troops under Vitellius; showed great prowess, but slew himself after defeat at *Bedriacum*.

OTIS, ELWELL STEPHEN (1838-1909), major-general; *b.* Frederick, Maryland. He entered the Union army in 1862 as captain of a New York infantry regiment of volunteers for service in the Civil War after graduating from Rochester University and Harvard Law School. He became brigadier-general in 1865 following an active part in many battles and injuries from wounds that disabled him for further service. After the war he returned to duty, took part in the Indian campaign against Sitting Bull, headed the Leavenworth School of Infantry and Cavalry, and held various high commands, including the post of military governor of the Philippines, retiring in 1902.

OTIS, HARRISON GRAY (1837-1919), army general, and publisher; *b.* Marietta, O. He took part in the Civil War, rising to lieutenant-colonel of volunteers. Later he edited a paper in his home town, served as official reporter of the Ohio legislature, and held a post in the government printing office at Washington. In 1876 he became identified with California journalism as editor of the *Press* of Santa Barbara, and afterwards of the Los Angeles *Times*, of which he acquired control. His editorial policy antagonized local union labor, and in 1910 his newspaper building was blown up and twenty one employes killed. The crime was traced to two men named McNamara, who were brothers, and whose confession linked their offense with a labor union. In the Spanish-American war and the Filipino insurrection he served in the Philippines as a brigadier-general.

OTIS, JAMES (1725-1783), Revolutionary leader and lawyer; *b.* West Barnstable, Mass. He was admitted to the bar in 1748 and developed a practice in Boston that placed him in the front rank of his profession. He became attorney-general of Massachusetts colony, and resigned the office in 1761 rather than defend before the court the issue of customary writs asked by Great Britain to aid the search for smuggled goods. Boston and Salem merchants petitioned against granting the writs, and he appeared on their behalf, challenging England's right to require searches of ships and her claim to control and tax the colonies. Thereafter he was a foremost figure in the revolutionary agitation and in the conflict of views that preceded the war. His participation in political strife led to his being struck on the head in a violent quarrel (1769) by one of the customs commissioners, who had accused him of treason. His subsequent insanity was ascribed to this cause. When the revolutionary war came he succeeded in escaping his custodians and taking part in the battle of Bunker Hill. A flash of lightning killed him. He was credited with contributing the initial force and direction to the struggle that ended with American independence.

OTRANTO (40° 8′ N., 18° 30′ E.), seaport, Apulia, Italy; ancient *Hydruntum*; ruined castle.

OTTACAMUND, UTAKAMAND (11° 24′ N., 76° 44′ E.), town, sanatorium, Nilgiri Hills, Madras, India. Pop. 16,000

OTTAWA (45° 28′ N., 75° 20′ W.), river, Canada; enters St. Lawrence by two channels, enclosing the island on which stands Montreal.

OTTAWA Cap. of Dominion of Canada, in Ontario prov. (45° 25′ N., 75° 43′ W.), beautifully situated on Ottawa (s. bk.) at confluence with Rideau, below Chaudière falls. Notable features are R. C. cathedral, Christ Church, government buildings on Parliament Hill, Archive Buildings, and Royal Mint on Nepean Point, museum, art gallery, univ., art academy, gov.-gen.'s residence (Rideau Hall), and several public parks. On Feb. 4, 1916, Parliament buildings almost completely destroyed by fire, the interior of Senate and House of Commons being completely ruined. Ottawa is center of lumber trade; manufactures leather, ironware, machinery, matches, furniture, electric cars; numerous saw and flour mills. Founded in 1829, Ottawa was named Bytown until 1854; became capital of the two Canadas (1858), of Dominion (1867). Rideau Canal joins Ottawa with Kingston on Lake Ontario. Pop., 1921, 107,137.

OTTAWA, a city of Illinois, in La Salle co., of which it is the county seat. It is on the Burlington and Chicago, the Rock Island and Pacific, and other railroads, and at the junction of the Illinois and Fox rivers. Its industries include the manufacture of window glass, lamp chimneys, sewer pipe, flour, agricultural implements, etc. It is the seat of Pleasant View College, St. Francis Xavier Academy, and has a hospital, public library, and parks. Pop., 1920, 10,816.

OTTAWA, a city of Kansas, in Franklin co., of which it is the county seat. It is on the Missouri, Pacific and the Atchison, Topeka and Sante Fe railroads, and on the Marias des Cygnes river. Its industries include the manufactures of carriages, furniture, soap, flour, gas engines, foundry products. It is the seat of the Ottawa University, Chatauqua Assembly, and has a public library and a hospital. Pop., 1920, 9,018.

OTTAWA UNIVERSITY, situated at Ottawa, Kansas, was founded in 1865 for the higher education of Indians under Baptist auspices. The instruction afterwards extended to white students and became co-educational. There are colleges of art, philosophy and science, and academic, public speaking, education, music, art and business departments. In 1922 the students numbered 431 and the teaching staff 26 under the direction of S. E. Price.

OTTER, see WEASEL FAMILY.

OTTERBEIN, PHILIP WILLIAM (1726-1813), an American clergyman.

In 1789 he organized the sect of the United Brethren in Christ.

OTTERBEIN UNIVERSITY, situated in Westerville, Ohio, is a co-educational institution founded in 1847 by the United Brethern in Christ, the first seat of learning formed by this denomination. Its departments embrace the regular preparatory and collegiate courses and schools of music, art, eloquence and commerce. In 1922 there were 503 students and 34 teachers under the presidency of W. G. Clippinger.

OTTERBURN (55° 15′ N., 2° 10′ W.), village, Redesdale, Northumberland; scene of Douglas's defeat of Hotspur, 1388, celebrated in ballads *Chevy Chase* and *The Battle of Otterburn.*

OTTO I., OTHO (912-73), emperor of Holy Rom. Empire; *s.* of Henry the Fowler; elected king of Germany, 936; conquered Huns, Hungarians, Bohemians, and Dukes of Bavaria and Franconia; crowned emperor, 962, and sought to revive empire of Charlemagne.

OTTO II (955-83), emperor of Holy Rom. Empire, 973; Bavaria partitioned, 976-78; Fr. attempts on Lorraine checked 978; protected Papacy and attacked Muhammadans.

OTTO III (980-1002), emperor of Holy Rom. Empire, 983; crowned, 996, and with Popes Gregory V. and Sylvester II. sought to revive Rom. greatness.

OTTO IV., THE LION (*c.* 1175-1218), emperor of Holy Rom. Empire; rival of Philip of Swabia for empire, 1197; after years of warfare was crowned, 1209, by Pope Innocent.

OTTO I (1815-67), king of Greece; *s.* of Ludwig I. of Bavaria; elected king, 1832, by conference of London; insurrections ended in O.'s flight and deposition, 1862.

OTTO OF FREISING (*c.* 1114-58), Ger. chronicler and bp.; wrote *De Duabus civitatibus,* a chronicle in eight books; *Gesta Friderici imperatoris.*

OTTO OF NORDHEIM (*d.* 1083), Duke of Bavaria, 1061; frequently in revolt against Henry IV., king of Germany; deposed, 1070; led Saxon revolts, 1073, 1077.

OTTOCAR I. (*d.* 1230); king of Bohemia; steered skilful course between rival emperors, Philip of Swabia and Otto IV.—**OTTOCAR II., THE VICTORIOUS,** king of Bohemia, 1253-78; united Austria, Styria, Carinthia, and Carniola to Bohemia; slain at *Laa.*

OTTOMAN EMPIRE. See **TURKEY.**

OTTUMWA, a city of Iowa, in Wapello co., of which it is the county seat. It is on the Burlington, the Wabash, and other railroads, and on the Des Moines river. It is the center of an important coal region and has iron works, meat packing plants, starch mills and other industries. The public buildings include U. S. government building, business college, court house and hospital. Pop., 1920, 23,003.

OTWAY, THOMAS (1652-85), Eng. tragedian. In 1680 he wrote a poem, *The Poet's Complaint of his Muse,* the fine tragedy called *The Orphan,* and *Caius Marius.* In 1682 appeared his greatest drama, *Venice Preserved.*

OUDENARDE (50° 51′ N., 3° 36′ E.), town, on Scheldt, Belgium; in province of East Flanders; with Notre Dame (XIII. cent.), St. Walburga, and fine town hall; textile industries. Here Allies under Prince Eugene defeated French under Vendome, 1708. Pop., *c.* 7,000. In World War a division of American troops pursued the retreating German army to this point in November, 1918.

OUDH, see **UNITED PROVINCES OF AGRA AND OUDH.**

OUDINOT, CHARLES-NICHOLAS (1767-1847), duke of Reggio, 1810; marshal of France, 1809; distinguished in revolutionary wars under Marceau and Masséna; led 'grenadiers of Oudinot' in chief campaigns till capitulation of Paris, 1814; submitted to Bourbons and continued in high commands.

OUIDA, pseudonym of **LOUISE DE LA RAMÉE** (*c.* 1840-1908), Eng. novelist wrote *Strathmore, 1865; Under Two Flags, 1867; Puck, 1870; Moths, 1880.*

OUNCE, originally 1/12 of a lb., as it still is in Troy weight, where an O. weighs 20 pennyweights or 480 grains; in avoirdupois weight 16 drams or 437.5 grains.

OUNCE, see under **CAT FAMILY.**

OURO PRETO (20° 18′ S., 43° 18′ W.), city, state of Minas Geraes, Brazil; owing to mountainous situation, streets steep and crooked; has numerous interesting buildings and mining school; once famous gold-mining center; but mines now almost exhausted. Pop., 12,000.

OUSE (1) (53° 43′ N., 0° 44′ W.); Yorkshire river, formed by junction of Swale and Ure, and enters Humber. (2) Great Ouse rises in Northampton and falls into Wash. (3) Little O., tributary of Great O. (4) river in Sussex; flows into Eng. Channel.

OUTRAM, SIR JAMES, BART (1803-63), an English general; *b.* in Derbyshire. He rendered valuable service in the first Sikh War, and was from 1847-51 resident at Baroda, and from 1855 at Oudh. He went with Havelock to the relief of Lucknow, and commanded the garrison there during the second siege.

OUZEL, a genus of perching birds included in the family of thrushes. The water-ouzel belongs to a different family.

OVAR (40° 51′ N., 8° 38′ W.), town, Beira, Portugal, on Averiro Lagoon; fishing center. Pop. 10,700.

OVARIOTOMY, the operation of removing one or both of the ovaries, for cystic and other changes or to alleviate morbid conditions in other organs of generation; first successfully performed, partially, by Houston of Carluke in 1701, and completely by M'Dowell of Kentucky, in 1809.

OVARY, DISEASES OF, see GYNECOLOGY.

OVENS, COKE. See COKE.

OVERBECK, JOHANN FRIEDRICH (1789-1869), Ger. painter; studied first in Vienna, later in Rome, where he attracted notice in 1811 by a picture of the Madonna. He painted several frescoes in Rome, and one fresco, *The Vision of St. Francis,* his best work of that kind, at Assisi.

OVERBURY, SIR THOMAS (1581-1613), Eng. poet and prose writer; friend of Robert Carr, a minion at court of James I.; was poisoned in Tower. His *Characters* are important in the history of the essay.

OVERMAN, LEE SLATER (1854), a United States senator, *b.* at Salisbury, N. C., *s.* of William and Mary E. Overman. He was educated at Trinity College, N. C. After teaching school for one year he was the private secretaryto Gov. Vance from 1877 until 1878 during which year he was admitted to the bar. He was then private secretary to Gov. Jarvis during 1879 and the following year began the practice of law at Salisbury. He was a member of the N. C. House of Representatives, 1883, 1887, 1893, 1900, (speaker 1893), after which he was Pres. of the Democratic State Convention and also presidential elector at large in 1900, and then United States Senator for four terms 1903-27.

OVERSOUL, term used by Emerson to express absolute reality from which is derived all that is valuable and universal in experience of mankind.

OVERTURE, the name of a musical form, originally given to the opening number of an opera. Strictly, it is the instrumental introduction to any vocal work, whether opera or oratorio; but there is also the concert Overture, an individual composition, of which Beethoven's *Egmont* and Mendelssohn's *Hebrides* are specimens.

OVERYSSEL (52° 25′ N., 6° 30′ E.); province, N. Holland, between Zuyder Zee and Prussia; area, 1,291 sq. miles; rich grazing land; manufactures cotton. Pop. 1921, 437,320.

OVID, PUBLIUS OVIDIUS NASO (43 B.C.-17 A.D.), Rom. poet; *b.* Sulmo; *s.* of Rom. knight; ed. in rhetoric, Rome, with view to legal career; after filling minor offices, abandoned law for poetry; friend of Tibullus, Propertius, Aemilius Macer (with whom he spent a year in visiting Asia and Sicily), and other poets of younger generation; thrice married, lastly to member of Fabian *gens,* who introduced him into imperial society. In A.D. 9 Ovid was suddenly banished to Tomi, a town situated in semi-civilized country near mouth of Danube; reasons for banishment very obscure, though it is certain that Augustus cherished a grudge against O. for his immoral *Ars Amatoria,* written about the same time as the discovery of the liaison between Augustus's dau. Julia with Julius Antonius, 2 A.D. At Tomi O. spent remaining years of life, in discomfort and apprehension of barbarian inroads from Scythia; wrote continually to friends and patrons to produce his return, but Augustus remained firm, nor would Tiberius reverse his predecessor's decision. Probably greatest master of the elegy, his style is smooth and pleasing, never harsh or discordant. The *Amores,* dealing in three books with his relations with Corinna, who occupied his affections between his first and second marriage; the *Ars Amatoria,* giving directions to both sexes for the gratification of affection; the *Remedia Amoris,* sequel in different vein to *Ars Amatoria*; and *Medicamina formæ,* on the use of cosmetics, constitute his earlier poems. Next came *Metamorphoses* (in hexameters), recounting mythical tales of transformations; *Fasti,* unfinished antiquarian calendar; *Tristia,* poems of exile; and *Epistulæ ex Ponto,* complete the bulk of poet's work.

OVIEDO.—(1) (43° 20′ N., 6° W.), province N. Spain; area, 4,205 sq. miles; drained by Nalon, Sella, Navia; cattle breeding, mines, fruit; rich in minerals. Pop. 1921, 717,723. (2) (43° 22′ N., 5° 52′ W.), town, N. Spain; episcopal see, has cruciform cathedral; seat of

univ.; manufactures textiles. Pop. 1921, 55,460.

OVIEDO Y VALDÉS, GONZALO FERNANDEZ DE (1478-1557), a Spanish historian, *b.* at Madrid. In 1514 he was sent by Ferdinand to St. Domingo in the West Indies as inspector-general of the trade of the New World, and during his term of office acted with great cruelty and barbarity to the Indians, many of whom perished under his treatment. On his return to Spain he published his *Sumario de la Historia General y Natural de las Indias Occidentales* (Toledo, 1526), which appeared in its complete form, comprising fifty books, in 1783, translated by Eden (new ed. 1851-55). His principal work is the *Quinquagenas*, containing a full account of the most important persons in Spain, their lineage, arms, revenues, etc., together with an inexhaustible fund of private anecdote.

OVUM, OR EGG, is a single cell which, when fertilized by male seed, develops into a many-celled animal. Eggs are distinctly female products, and the majority are so minute as to be almost invisible. In some groups of animals, however, the egg reaches large size, notably in the closely related groups of reptiles and birds, where it is covered with a limy protecting *shell*. In all cases, however, the ovum remains a single cell, its size depending on the amount of food material or *yolk* which accompanies the essential portion. This essential portion, as in all cells, consists of a protoplasmic body in which is embedded a nucleus or germinal vesicle, containing a number, definite for each species, of tiny chromatin threads (*chromosomes*). It is generally held that in the nucleus, and probably in the chromosomes, there resides the maternal heritage of the offspring, the mysterious foundations upon which, in conjunction with those of the male cell, are built the sum-total of the characters of the progeny.

Eggs vary as much in their mode of deposition as in their size and appearance. The majority are laid singly, as in birds and reptiles, but many also are held together in aggregates, such as the clumped spawn of frogs, the ribbons of toads or nudibranch molluscs, or the floating egg-rafts of some acquatic insects. Except in cases of vegetable reproduction, the egg is the beginning of all living things; but this fact is not always patent, for, characteristically in mammals, and exceptionally in other groups, the eggs develop and hatch in the body of the mother, and living young are born.

OWATONNA, a city of Minnesota, in Steele co. Pop., 1920, 7,252.

OWEN, JOHN (1616-83), Eng. Puritan theologian; ed. at Oxford; on the Parliamentary side during the Civil War.

OWEN, SIR RICHARD (1804-92), Eng. zoologist; conservator of Royal College of Surgeons, and, till 1884, superintendent of the Natural History Department of Brit. Museum.

OWEN, ROBERT (1771-1858), Eng. Socialist reformer. O.'s importance is that he provided models for future legislation and roused strong feeling against existing conditions of labor; pub. *A New View of Society, 1813.*

OWEN, ROBERT DALE (1801-1877), social reformer and legislator; *b.* Glasgow, Scotland, *s.* of Robert Owen, a British social and industrial reformer of note. He and his father came to the United States to establish a cooperative community in Indiana. The project failing, he went back to England, returning in 1827, when he became naturalized and edited a socialistic and agnostical journal in New York City. Later he served in the Indiana legislature, represented that State in Congress from 1843 to 1847, and took an active part in obtaining property rights for married women and women in the state constitution. He served as American envoy at Naples from 1853 to 1858. He was one of the founders of the Smithsonian Institution.

OWEN, ROBERT LATHAM (1856), a United States senator, *b.* at Lynchburg, Va., *s.* of Robert Latham and Narcissa Chisholm Owen. He was educated at Washington and Lee University. He began the practice of law in 1880, was U. S. Indian agent for the Five Civilized Tribes from 1885-9, and the following year organized the First National Bank of Muskogee of which he was president for the next ten years. He was a member of the Democratic National Convention from 1892-6 and United States senator from Oklahoma for three terms, 1907-25, and managed the passage of the Federal Reserve Act and Farm Loan Act in the U. S. Senate.

OWEN'S COLLEGE. See MANCHESTER.

OWEN SOUND (44° 35′ N., 80° 50′ W.), town, port of entry, Ontario, Canada, on Georgian Bay; machinery; wooden ware. Pop. 10,500.

OWENSBORO, a city of Kentucky, in Daviess co., of which it is the county seat. It is on the Louisville, Henderson and St. Louis, the Illinois Central, and

the Louisville and Nashville railroads, and on the Ohio river. It has tobacco interests, together with manufactures of flour, shingles, sewer pipe, furniture, etc. It is the seat of the Owensboro Female College and St. Francis Academy. Pop. 1920, 17,434.

OWLS, nocturnal birds of prey, with sharp strong beaks and claws. The 'wise' look so characteristic of owls is due to the fact that the eyes are large, are directed forwards, and are surrounded by a whorl or circle of fine radiating feathers. Owls are found all the world over, living mainly in trees but sometimes in old buildings, and feeding usually on rats, mice, and smaller mammals, or on birds, reptiles, and insects. They fall into two families: the True Owls (Bubonidæ), with almost 300 species, including the large Eagle-Owls (Bubo), which kill hares, rabbits, or even young deer, and the Tawny, Long-Eared, and Short-Eared Owls (*Syrnium* and *Asio*); and the Barn Owls (Strigidæ), with 26 species, the White or Common Barn Owl (*Strix*).

OWOSSO, a city of Michigan, in Shiawassee co. It is on the Michigan Central, the Grand Trunk and Ann Arbor railroad, and on the Shiawassee river. Its industries include the manufacture of doors, window screens, caskets, furniture and rugs. It has a public library. Pop. 1920, 12,575.

OX GROUP, a section of the cattle tribe, *Bovidæ* (*q.v.*), distinguished by a broad, naked muzzle, the presence of round or ridged equal horns, long tails, usually tufted, and a dewlap on the throat of the male. Although common in Europe, Asia, and Africa, there is only one Amer. species and one in Celebes. This last is the small black Anoa (*Anoa depressicornis*), included in the group of the Buffaloes, to the young of which it presents a striking resemblance. Closely related to the Buffaloes are the Bisons (*Bison*), comprising two species, the European and the Amer. Bison—the American, now nearly extinct, being slightly smaller than the European species (only found in the forests of Lithuania and the Caucasus).

Distinguished from the Bisons and Oxen by the different position of the long hair forming a fringe over shoulders, flank, and tail, the Yak (*Poëphagus*) inhabits the high plateaux of Tibet, where the tame animals are used as beasts of burden.

Those nearly related to the typical Oxen are three Oriental species comprising the shy Gaur (*Bos gaurus*), with arched back and strange concave profile, found in the large Indian forests; the Gayal or Mithan (*Bos frontalis*), occurring in Assam and adjacent districts, with shorter and rounder horns and without the large frontal crest of the Gaur; and the Banteng (see BANTIN).

Lastly, the typical Ox is represented at the present day only by domesticated breeds belonging to two species, *Bos taurus* and *Bos indicus*, though half-wild herds of the former have been preserved.

OXALIC ACID ($H_2C_2O_4+2H_2O$), crystalline solid, soluble in water; poisonous; salts present in wood sorrel (*oxalis*), rhubarb, dock; formed when sugar, fats, etc., are oxidized with nitric acid, or sawdust is heated with alkali. The simplest dicarboxylic acid, constitution, HOOC.COOH, gives ($CO+CO_2$) with hot H_2SO_4.

OXENBRIDGE, JOHN (1608-74); Eng. Nonconformist minister.

OXENHAM, JOHN, Eng. author. Writings include *John of Gerisau, 1902*; *Barbe of Grand Bayou, 1903*; *Carette of Sark, 1907*; *Great-Heart Gillian, 1909*; *The Quest of the Golden Rose, 1912*; *Mary All-Alone, 1913*; *Broken Shackles, 1914*; *My Lady of the Moor, 1916*; *The Fiery Cross, 1917*; *High Altars, 1918*; has also written verse, including the following books: *Bees in Amber, 1913*; *The King's Highway, 1916*; *The Vision Splendid, 1917*; *Hearts Courageous, 1918*; *All Clear, 1919*; and a vol. of essays, *Winds of the Dawn, 1919*.

OXENSTJERNA, AXEL, COUNT OF (1583-1654), Swed. statesman; greatest member of prominent Swed. family; app. Chancellor by new king, Gustavus Adolphus, 1612, and restored peace and prosperity; made peace with Denmark, 1613; ended war with Russia by Treaty of Stolbova, 1617.

OXENSTJERNA, BENEDICT (1623-1702), Swed. statesman; Chancellor and Prime Minister, 1681; vainly opposed foreign policy of Charles XI. and Charles XII.

OXENSTJERNA, GABRIEL THURELON, COUNT OF (1641-1707), Swed. poet and statesman.

OXFORD (51° 46′ N., 1° 16′ W.), city, parl. and munic. bor., co. tn., Oxfordshire, England, seat of celebrated univ.; beautifully situated on junction of Cherwell and Thames. The principal streets (High Street, Queen Street, Cornmarket Street, and St. Aldate's Street) meet at place called *Carfax*, in center of old Oxford. The town belongs to an earlier date than the univ., and takes a prominent place in history; after many attacks by Danes, it was taken by Sweyn in 1013; in 1142 besieged by Stephen; Ridley,

Latimer, and Cranmer were martyred here in the reign of Mary Tudor; during Civil War town became headquarters of Charles I.'s party, and was the scene of Jacobite riots in beginning of George I.'s reign.

The university is believed to have originated in XII. cent., and now comprises 21 colleges and one hall:—

AllSouls, founded by Chichele in 1437, possesses beautiful chapel and important library; front quadrangle remains almost unchanged. *Balliol*, founded by Devorguilla, mother of Balliol, King of Scotland, in 1269. *Brasenose*, built on site of Brasenose Hall in 1509, contains a particularly fine gateway. *Christ Church*, most magnificent of all Oxford colleges, was founded by Wolsey in 1525 as Cardinal College; site included St. Frideswide Priory, and some of the old buildings still exist; coll. was remodelled by Henry VIII., and in 1532 named Christ Church; buildings are of great architectural interest, particularly those built by Wolsey; old church of the Priory serves as cathedral and coll. chapel. *Corpus Christi* was founded in 1516; *Exeter*, founded 1314; *Hertford*, founded 1874, but since XIII. cent. there have been many halls on same site; *Jesus*, founded in 1571 for Welshmen by Price, and site provided by Elizabeth; *Keble*, erected by subscription in 1870 in memory of Keble. *Lincoln*, founded in 1429; refounded in 1474; contains fine chapel. *Magdalen*, was founded in 1458 by Bishop of Winchester, who bought up Hospital of St. John the Baptist; hospital chapel and kitchen still remain; notable features are bell tower and beautiful gardens; chapel music is celebrated. *Merton* was founded first in Surrey in 1264 by Merton, and removed to Oxford in 1274; chapel and library particularly noteworthy. *New*, founded in 1379; chief features are chapel cloisters and gardens. *Oriel*, founded by Edward II. in 1326; now almost completely modern (St. Mary's Hall was incorporated with Oriel in 1896). *Pembroke* was founded in 1624. *Queen's* was erected in honor of Queen Philippa in 1340; buildings belong mostly to XVII. and XVIII. cent. *St. John's* built in 1555 on site of St. Bernard's ,includes portions of old coll.; Canterbury quadrangle was erected by Laud. *Trinity*, founded 1555, stands on site of Durham Coll.; some of the anc. buildings still remain. *University*, endowed by William of Durham in 1249; none of old buildings remain. *Wadham*, founded 1613, occupies site of Austin Friary; contains beautiful chapel and gardens. *Worcester*, founded in XIII. cent. as Gloucester Coll., was refounded in 1714. *St. Edmund's Hall* was founded in 1226.

Other educational institutions are St. Hugh's Hall, St. Hilda's Hall, Somerville Coll., and Lady Margaret Hall for women; Manchester Coll., Mansfield Coll., Wycliffe Hall, Pusey House ,and St. Stephen's House; connected with univ. are Sheldonian Theatre (where univ. public ceremonies take place), Ashmolean Museum, Univ. Museum, Indian Institute, Bodleian Library, Divinity School, Clarendon Press buildings, Univ. Galleries, Univ. Observatory, Radcliffe Observatory and Library, and Taylor Institute. Apart from cathedral, principal churches are St. Mary's, St. Michael's, St. Peter's-in-the-East, St. Giles's, and All Saints'. Oxford contains many interesting old houses and remains of a castle. The university was opened for first time to women, 1920. Pop. 1921, 57,052.

OXFORD, EDWARD DE VERE, EARL OF (1550-1604), Elizabethian courtier and author of comedies and light verse; succ. 1562; first wife was *dau.* of Lord Burleigh; fought against Armada.

OXFORD, PROVISIONS OF, decrees of Parliament which sat at Oxford, 1258, for reform of abuses in realm; sole record preserved in *Annales monastici*.

OXFORD, ROBERT DE VERE, EARL OF (1362-92), cousin of Richard II.; laden with honors and roused jealousy of nobles; defeated by Gloucester at *Radcot*, 1387; attainted and fled abroad.

OXFORD, ROBERT HARLEY, EARL OF (1661-1724), Brit. statesman; Speaker of House of Commons, 1701-5;First Lord of Treasury, 1711, and made Treaty of Utrecht; dismissed by Queen Anne as suspected Jacobite, 1714.

OXFORD MOVEMENT, THE, a revival of Church feeling in England, heralded by Keble's *Christian Year*, and inaugurated by Keble, Newman, Pusey, and others, who published *Tracts for the Times*; emphasized the catholicity of the English Church and the value of the Sacraments; differed from the Evangelical revival in its adherence to ecclesiastical teaching and tradition.

OXFORDSHIRE (51° 45′ N., 1° 15′ W.), county, England; bounded N. by Warwick and Northampton, E. by Bucks S. by Berks. W. by Gloucester; area, 755 sq. miles. Soil is particularly fertile, O. being one of most productive counties in England; chief crops are barley, oats, and wheat; stock raised; paper made at Shiplake and elsewhere, gloves at Woodstock, blankets at Witney, agricultural implements at Banbury; manufactures

of bricks and lace also carried on. Chief towns are Oxford (county town), Banbury, Henley, Chipping Norton, Abingdon, and Woodstock. O. played prominent rôle in Civil War; battles of *Chalgrove, 1643*, and *Cropredy Bridge, 1644*. Pop. 1921, 189,558.

OXFORD UNIVERSITY. See OXFORD.

OXIDE, compound of an element or radicle with oxygen. Metals form chiefly basic O's, non-metals acidic O's. Also there are *peroxides*, which readily yield oxygen, or are oxidizing agents, and a few neutral O's (*e.g.* H_2O).

OXIMES, first obtained by Victor Meyer, 1882, are colorless liquids or crystalline solids.

OXUS, OR AMU DARYA, important river in Central Asia; rises in Pamir plateau, forms for some distance boundary between Afghanistanand Bokhara, flows through Bokhara and Kihva, and falls into southern extremity of Sea of Aral by numerous mouths. River took prominent part in ancient history, and was crossed by both Cyrus and Alexander; believed to have flowed at one time into Caspian Sea. O. is navigable as far as Charjui, where it is crossed by railway from Merv to Samarkand; there is regular steamer service.

OXYGEN (O, 16.00), gaseous element, molecule = O_2; occurs free in air (one-fifth of the total volume) and combined in water (88.81 per cent.), and in the rocks of the earth's crust (44 to 48 per cent.); the most plentiful and widely diffused terrestrial element. Oxygen was first obtained by Scheele (1773), and by Priestley (1774), who prepared it by heating 'mercurius calcinatus' (HgO), named by Lavoisier (oxygen = acid-producer), who thought it the essential constituent of an acid, and explained its function in combustion.

Preparation.—It is now commercially prepared by the fractional distillation of liquid air. (See NITROGEN.) On a small scale it may be prepared by heating oxygenated compound—*e.g.*, potassium chlorate, manganese dioxide, red lead, etc.

Properties.—Colorless, invisible, tasteless, odorless gas; coefficient of solubility in water at 0° C. = 0.0489. Liquid oxygen is pale blue and strongly magnetic; b. p. (atmospheric pressure) —182.5°; critical temp. —119°; critical pressure, 58 atmospheres. Solid oxygen melts below —223°. Vigorously supports combustion of phosphorus, sulphur, charcoal, iron, wood, a taper, etc. In the oxy-hydrogen flame platinum melts, and lime shines with a dazzling light (lime-light). It is used industrially in conjunction with acetylene for the oxy-acetylene flame used in welding.

Physiological Action.—Oxygen is necessary for respiration, and for the decay of dead organic matter. It is thus converted into atmospheric carbon dioxide, from which the carbon is removed by green plants in sunlight. On account of its vigorous action pure oxygen is substituted for air when respiration is difficult, as in cases of suffocation, gaseous poisoning, and low vitality. Its long-continued respiration is harmful.

Oxides are formed by combination with every element, except (bromine) fluorine, and the members of the helium family. They may be basic, acidic, neutral, or peroxides.

OXYRHYNCHUS. See PAPYRUS.

OYAMA, PRINCE IWAO (1842-1916), Jap. soldier-statesman, a Samurai of Satsuma; attaché with Ger. army, Franco-German War (1870); helped to reorganize Jap. army (1873), and a commander during Satsuma rebellion (1877); minister of war (1880-95); led 2nd Army in Chino-Jap. War (1894-5), when he reduced Port Arthur, Wei-hai-wei, etc.; field-marshal (1898); chief of general staff (1899); and commander-in-chief in Manchuria, Russo-Jap. War (1904-5).

OYSTER BAY, a tn. and summer resort of Nassau co., New York, U.S.A., an the N. coast of Long Is. This town is connected with New York, a distance of about 32 m., by a steamboat service, and is, in addition, a favorite seaside resort and summer residence. It was for many years the residence of Theodore Roosevelt. Pop. 25,000.

OYSTERS, a genus (*Ostrea*) of Lamellibranen or Bivalve Molluscs which forms a favorite food supply of many nations. Its members possess the general structures of Lamellibranchs (*q.v.*), and in particular of the Pseudo-Lamellibranchia; are inactive creatures protected by a heavy shell composed of two unequal valves, the larger and convex left valve being that on which the animal lies, the lighter, flat right valve forming the upper lid. The two valves are held together by a single strong muscle. O.'s, of which there are many species, live in all seas, near the shore, preferably in shallow water free from disturbing currents. They congregate in great banks or beds, and so great is the fertility of the individuals that during the spawning season from May to Sept. the sea in the neighborhood is turbid with the young or 'spat.' The young O.'s grow about an inch in diameter each year until the third year, after which growth becomes

much slower. Seven to ten years is a common age for average O.'s.

The catching of O.'s for food forms a great industry centered chiefly in the U. S. A., France, and Britain. Many O.'s are dredged from native beds, but still more are cultivated in special ponds and artificial banks. The annual consumption is reckoned in many hundreds almost thousands, of millions.

Related to the Edible O.'s are the Pearl O.'s (*Meleagrina* or *Margaritifera*) of tropical seas, the shells of which supply useful and ornamental articles of mother-of-pearl, and from which marine pearls are obtained.

OZANAM, ANTOINE FRÉDÉRIC (1813-53), Fr. author; prof. at Sorbonne; researches throw new light on Dark Ages; wrote important *Etudes Germaniques*, *Dante ou la Philosophie Catholique*.

OZARK MOUNTAINS rise between the Missouri and Arkansas rivers from 1,200 to 1,800 feet above sea level, forming a plateau region in Illinois, southern Missouri, northern Arkansas, Kansas and Oklahoma. The hills are not in continuous ridges and have separate peaks. The southern slopes are heavily forested and believed to be rich in minerals.

OZIERI (40° 35′ N.; 9° 1′ E.); town, Sassari, Sardinia. Pop., 10,000.

OZOKERITE, mineral wax varying from very soft to hard; colors—brown, yellow, green; may be streaked or spotted; generally found in bituminous sandstones of coal measures, chiefly in Galicia and Austria.

OZONE, O_3, allotropic form of oxygen, produced by passing electric sparks on the silent electric discharge through the gas; also by chemical means; peculiar smell; powerful oxidizing agent, unstable, destroyed by heat; presence in the atmosphere uncertain.

P

P, 16th letter of alphabet; originally in Gk. a hook which gradually became a loop in Lat. alphabet; a labial mute; seldom used as initial letter in Teutonic; often silent, as in *pneumonia, receipt*; *ph* is pronounced *f*.

PABNA, PUBNA (24° N., 89° 17′ E.), town (and district), Rajshahi Division, Bengal, India. Pop. 21,000; (district) 1,500,000.

PACA (*Agouti paca*), large nocturnal Rodent found in forests and on river banks in Central and South America.

PACHECO, FRANCISCO (1571-1654) a Spanish painter, born in Seville. In 1611 he visited Madrid, and eventually opened a school of painting in Seville. Among his pupils here was Velasquez, who married his daughter. The latter part of his life was spent in literary work, chiefly on the subject of painting. Some of his best paintings, dealing chiefly with religious subjects, are in Madrid.

PACHMARHI (22° 30′ N., 78° 30′ E.), hill station, sanatorium, Hoshangabad district, Central Provinces, India.

PACHUCA (20° 5′ N., 98° 50′ W.) capital of state of Hidalgo, Mexico; silver mines. Pop. 39,000.

PACHYDERMATA, a classification of mammals, founded by Culver, for a number of thick-skinned, non-ruminant, hoofed animals, *e.g.* elephant and hippopotamus.

PACIFIC OCEAN, largest of the five great oceans of the world; occupying about half the water surface of the globe. P. O. extends from Arctic Ocean at Bering Strait to the Southern Ocean at *c.* 40° S., and lies between America (on E.) and Australia and Asia (on W.); total length from N. to S., *c.* 9,000 miles; greatest breadth (near equator), over 10,000 miles. Area—*c.* 65,000,000 sq. miles—is more than twice area of Atlantic; drainage area, however, is only 7,500,000 sq. miles (much less than that of Atlantic); largest Asiatic rivers are Amur, Hoang-ho, Yang-tse-kiang, Mekong, Menam, Canton; American rivers are Yukon, Fraser Columbia, Colorado. Salinity is less than that of Atlantic. Mean depth is about 2,500 fathoms; greatest depth on Asiatic side, viz. 40 miles E. of Mindanao (Philippines), 32,089 ft. (greatest recorded ocean depth); between Midway Islands and Guam, 31,614 ft.; E. of Kermadec Islands, 30,920 ft.; N.E. of Japan, 27,925 ft. The coast-line of America and Australia is generally mountainous with few inlets—Gulf of California, Puget Sound, etc.; the Asiatic coast is generally flat with many large indentations—Yellow, China, Japan, Okhotsk Seas, etc. See Map of the World.

P. O. has innumerable continental and oceanic islands, mainly in centre and west, either of volcanic or coral formation, viz. New Zealand, New Guinea, Borneo, Sumatra, Java, Japan, Philippines, New Hebrides, Galapagos, Solomon, Fiji, Samoa, Hawaii, Ladrones, Carolines, Aleutians, etc. Climate generally is tropical. Principal prevailing winds are the two trade-winds blowing from N.E. and S. E., with broad belt of equatorial calms between them. Monsoons also blow regularly, and violent storms occur in lat. 30° to 5° N., China Sea, etc. The currents resemble those of Atlantic; the warm Kuro-shiwo Current, or Black Stream of Japan, corresponds to Atlantic Gulf Stream; the cold Humboldt or Peruvian Current in South Pacific (corresponding to Atlantic Benguela Current) flows northward, eventually joining the South Equatorial Current.

P. O. was discovered by Vasco Nuñez de Balboa, 1513, when he crossed the Isthmus of Panama; traversed by Magellan, 1520-21, and named Pacific on account of calms encountered there after previous violent storms. Chief steamship routes are from Vancouver and San Francisco to New Zealand, Australia, and Japan; another route from New Zealand to Europe passes round Cape Horn. Chief powers represented in Pacific are Britain, Japan, United States of America, France.

PACIFIC RAILROADS, designation applied to the group of trans-continental railroads that were extended from

eastern and middle western sections of the Union to the Pacific Coast, and that were of incalculable importance in national growth and development. The Union Pacific Railroad was completed on the 8th of May, 1869. In 1883 three other great routes were opened for operation. The Southern Pacific in co-operation with the Galveston, Harrisburg and San Antonio Railroad reached the coast by way of Louisiana, Texas, New Mexico, Arizona and California. The Northern Parific, running through Minnesota, Dakota and Washington was completed Sept. 8, 1883. The fourth great transcontinental route was opened in the same year and was signalized by the completion of the western division of the Atlantic and Pacific Railroad to the Needles on the Colorado River, where connection was made with the Southern Pacific, and to Albuquerque, New Mexico, where it connected with the Atchison, Topeka and Santa Fe. Government aid was extended liberally to these enterprises which were felt to be indispensable to the development of the great West; but the country has benefited a hundred fold for every dollar expended in linking together the Atlantic and Pacific coasts.

PACIFIC TREATY, FOUR POWER. See CONFERENCE ON THE LIMITATION OF ARMAMENTS.

PACK, CHARLES LATHROP (1857), Forester, Economist. *B.* at Lexington, Mich. Educated in a public school in Cleveland. Explored the forests of Canada and America and also studied the Black Forest of Germany. President of the American Forestry Association for four years, 1916-1920. Awarded many medals including the Grand Medal of Honor, National Societé d'Acclimatation de France. Author of *Roads of Remembrance.* Wrote on food production and economic subjects. In 1907 on the invitation of President Roosevelt attended the Conference of Governors. Appointed by him a member of the Conservation Commission.

PACKARD, ALPHEUS SPRING (1839-1905), an American zoologist, *b* in Brunswick, Me. He graduated from Bowdoin College, in 1861, and from the Maine Medical School in 1864, later taking a special course under Agassiz in the Lawrence Scientific School of Harvard University. He was director of the Peabody Academy of Science, during 1867-78. His works on insects were regarded as among the most authoritative of their time. His works include *Half hours with the Insects,* 1877 and *Lamarck, the Founder of Evolution; his Life and Work,* 1901.

PACKARD, FRANK LUCIUS (1877) an author, *b.* at Montreal, Que., o American parents *s.* of Lucius Henr and Frances Joslin Packard. Afte graduating from McGill Univ. in 1897, h took post graduate course L'Institu Montefiore, University of Liêge, Bel gium. After being engaged in enginee ing work in the United States for a num ber of years he began writing for variou magazines in 1906. Author: *On th Iron at Big Cloud,* 1911; *The Miracl Man,* 1914; *The Beloved Traitor,* 1916 *The Sin That Was His,* 1917; *The Fur ther Adventures of Jimmie Dale,* 1919 *The Night Operator,* 1919; *From No On,* 1920; *The White Mail,* 1920 an *Pawned,* 1921.

PACKARD, WINTHROP (1862), Edi tor, author; *B.* at Boston, Mass. Fo one year a student at the Massachusett Institute of Technology. Chemist wit various concerns from 1884-1899. I 1894 editor of a journal and in 1896 asso ciated with a Boston Magazine. A member of the Corwin exploring expedi tion to Alaska as newspaper correspon dent. Served in the United States Nav during the Spanish-American War. A member in 1917 of Company D, 13t regiment, Massachusetts State Guard Author of: *The Young Ice Whalers* 1908; *Wildwood Ways,* 1909; *Wil Pastures,* 1909; *Florida Trails,* 1910 *Woodland Paths,* 1910; *Wood Wande ings,* 1910; *Literery Pilgrimages of Naturalist,* 1911; *White Mountain Trail* 1912; *Old Plymouth Trails,* 1920.

PACKER COLLEGIATE INSTITUT a secondary school for girls, chartered i 1853 and opened in Brooklyn, N. Y., i 1854. Its buildings were erected on th site of the Brooklyn Female Academy burned in 1852, and the institution wa in a sense a re-establishment of the ear lier school. It has three departments the elementary, with seven grades; th academic, with four grades; and th Collegiate, with two grades, the latte overlapping the regular college course by two years.

PACKING INDUSTRY, the nam being derived from the canning of meat but now covering the whole meat suppl trade, including fresh meat in refrigera tion. This wider aspect of the industr received its first impulse from Georg H, Hammond who, in 1869, bega shipping fresh meat in refrigerator car from Chicago to Boston, In 187 Gustavus F. Swift established a simila business at the Union Stock Yards i Chicago, and then, spurred on by compe tition the industry developed rapidly supplies being sent to New York, Phila delphia and other eastern cities as well

From then onward the industry, centering in Chicago, not only grew in proportions, but widened in scope, taking in the curing of hams, the manufacture of sausage, lard, pickled meats and a great variety of canned goods. From by-products, such as the blood, bones and hides of the slaughtered anmials, arose a trade in glue, buttons, combs, curled hair, soap, candles, oils, glycerin, and vast quantities of fertilizers for agricultural purposes. At a later date the expansion included also the supply of other food stuffs, the Chicago firms thus developing into what has been termed by some ciritcs as a gigantic food trust. The live stock is all slaughtered in the Chicago stock yards the animals being shipped thence from various district markets, to which they are first shipped by the actual producers, through commission merchants. The cattle, when received at these district markets, are set up at auction, the representatives of the packers, according to their statements, bidding against each other privately day by day. Critics of the industry hold, however, that at this point there is no competition and that the prices paid to the producers are fixed by the packers arbitrarily, by mutual agreement. District markets are established at Kansas City, Mo.; East St. Louis, Ill.; South Omaha, Neb.; South St. Joseph, Mo.; South St. Paul, Minn.; Fort Worth, Tex.; Sioux City, Ia.; Oklahoma City, Okla.; Denver, Colo. and Milwaukee, Wis. The packing industry has been the subject of much antagonistic public sentiment and regulatory legislation, first aroused by the publication of Upton Sinclair's book, *The Jungle*, published in 1906 and purporting to show scandalous conditions of labor and unhygienic methods of packing. The pure food acts, passed by the Federal Government, followed as a result. Further legislation with the object of checking the monopolistic tendency of the industry has since been passed. An act designed to regulate the marketing of live stock and its products, known as the Packers and Stockyard Act, was approved by the President on August 15, 1921. Its purpose is to prevent the arbitrary fixing of prices at the district markets, the enforcement of this law being in the hands of the Secretary of Agriculture. In 1921 the combined receipts and shipments of cattle, hogs and sheep at Chicago, Kansas City, Omaha, St. Louis, Sioux City, St. Joseph and St. Paul were as follows; cattle, receipts, 8,676,063, shipments, 4,104,494; hogs, receipts, 22,080,870, shipments, 6,841,880; sheep, receipts, 11,755,676, shipments, 3,610,311.

PACORUS, name of several Parthian rulers of Arsacid line. Chief: Pacorus, who won great victories in Syria, Palestine etc. against Romans, as lieutenant of his f., Orodes I., 40 B. C., but was defeated and slain, 39.

PACTOLUS, in ancient times the name of a brook in Lydia, Asia Minor, now called Sarabat. It rises in Mt. Tmolus, and flows past Sardis into the Gulf of Smyrna. Its sands were once famous for gold, and tradition attributes the wealth of Croesus to these sands.

PACUVIUS, MARCUS (*c.* 220-130 B.C.), Rom. tragic poet; considered one of great poets of Rome; works have almost entirely perished, but were famous for their sublimity.

PADDINGTON.—(1) W. division of London, N. of Hyde Park, Pop. 1921, 145,600. (2) eastern suburb, Sydney, New South Wales. Pop. 23,000.

PADDLE, an oar used in propelling and steering canoes and boats by a vertical motion. Sometimes paddles with two blades are used.

PADDLE FISH, a fish allied with the Sturgeons. It often reaches a length of 5 to 6 feet. It is found in the Mississippi, Ohio and other large rivers in the United States.

PADDLE-WHEEL, a wheel used for propelling a boat or ship. It derives its name from the fact that, as originally tried, it consisted essentially of a series of paddles or paddle-like spokes inserted in an axle drum or wheel.

PADDOCK, ROBERT LEWIS (1869), bishop, *b.* in New York. In 1894 graduated from Trinity College and in 1897 from Berkeley Divinity School. At Southington, Conn. in 1897 in charge of a mission. From 1897-1898, general secretary of the Church Students' Missionary Association and assistant at St. Paul's Church, Cleveland. In 1898-1902 at Cathedral of St. John the Divine, New York as vicar of the pro-Cathedral and canon. Rector of the Church of the Holy Apostles, New York, 1902-1907. In 1907 consecrated bishop of Eastern Oregon. In France one year as associate field secretary, in charge of morale, at the Y. M. C. A. headquarters.

PADELFORD, FREDERICK MORGAN (1875), College Professor, *b.* at Haverhill, Mass. Graduated in 1896 from Colby College. In 1899-1901 professor of English at University of Idaho, and professor of English, since 1901 and dean of the Graduate School since 1920 of University of Washington. Author of *Old English Musical Terms.*

1900; *Early Sixteenth Century Lyrics*, 1906; *The Political and Ecclesiastical Allegory of the Faerie Queen*, 1911; *Samuel Osborne, Jamitor*, 1913; *George Dana Boardman Pepper, A* biographical sketch, 1914; *The Poems of Henry Howard, Earl of Surrey*, 1920. Translator: *Essays on the Study ond Use of Poetry*, by Plutarch and Basil, 1902. Select Translations from Scaliger's Poetics, 1905. Editor: Comedy of Errors, Tudor Shakespeare, 1913, The Ring and the Book, 1917.

PADERBORN (51° 43′ N., 8° 45′ E.), town, Westphalia, Prussia; seat of bishopric; has R.C. cathedral; trades in cattle, wool, fruit; has large railway workshops. Pop. 30,000.

PADEREWSKI, IGNACE J A N (1860), Polish pianist and statesman; *b.* Podolia. Russian Poland; showed great precocity, playing the piano in public at the age of twelve; studied at the Warsaw Conservatoire and in Berlin; first concert tour was made in 1878; not proving sufficiently successful, he devoted himself to teaching music in Warsaw and in Strasbourg; in 1884 he turned to the concert platform again, and in 1887 appeared in Vienna with marked success; this was followed by many tours in Germany, England, France, and U.S., and Paderewski became recognized as one of the greatest of pianists. During the Great War he was sent to America as plenipotentiary by the National Polish Committee; gave numberless concerts, delivered many addresses, and is said to have spent the greater part of his fortune in his efforts to rouse sympathy for the Polish cause. In Jan. 1919 he was made prime minister of the reconstituted Polish state, and became one of the Polish delegates to the Peace Conference; finding himself out of agreement with many of his own supporters he resigned the premiership in Dec., 1919. In 1923 he renewed his career as a pianist and gave a series of successful recitals in the United States.

PADGETT, LEMUEL P., (1855), congressman, *b.* at Columbia, Tenn., *s.* of John B. and Rebacca Ophelia Phillips Padgett. He was educated at Erskine College, S. C. He was admitted to the bar in 1877 and after 1879 was engaged in the practice of law at Columbia, S. C. He was a presidential elector in 1884, a member of the Tennessee Senate from 1898-1900 and a member of the 57th to 67th Congresses, 1901-1923, 7th Tennessee District. Democrat.

PADIHAM (53° 48′ N., 2° 19′ W.), town on Calder, Lancashire, England; cotton mills. Pop, 13,500.

PADILLA, JUAN LOPEZ DE (1485-1521), Span. hero; led rebellio against Charles V.'s taxations; defeate at *Villalar* and beheaded.

PADISHAH, PADISHAG, one titles of Shah of Persia and Sultan Turkey.

PADUA, PADOVA (45° 23′ N.; 1 53′ E.), city, N. Italy, capital of province, on Bacchiglione; Lat. *Patav um* (q.v.); chief features—arcade streets, several ancient bridges, church of St. Anthony, Eremitani (XIII. cent. Madonna della Arena (frescoes by Gio to), Santa Giustino, Palazzo Ragio 1172-1219, univ. (XIII. cent.), librar Donatello's equestrian statue of Gatt melata, Museo Civico; chief industrie machine works, chemicals, silk, distille ies; great centre of learning and art du ing Middle Ages and Renaissance. Po 105,000; prov. 551,000.

PADUCAH, a city of Kentucky, McCracken co. of which it is the coun seat. It is on the Nashville, Chattanoog and St. Louis, the Illinois Central, ar the Chicago, Burlington and Quinc railroads and at the junction of th Ohio and Tennessee rivers. Its indu tries include the manufacture of chair furniture, tobacco and farming impl ments. There is also a ship-buildin plant and tobacco warehouses and fa tories. The public buildings include courthouse, U. S. government buildin the Illinois Central Railroad Hospita and a high school. Pop. 1920, 24,735.

PÆAN, Gk. hymn to Apollo, then thanksgiving.

PÆLIGNI, ancient Italian peopl fought against Rome in second Samni War, 325 B.C.; received as allies b Rome, 305-302 B.C

PÆONIA, land of the Paeones, Thracian people; situated in N. Macedonia, between borders of Illyr and eastern bank of river Strymon.

PÆSTUM, ancient city of Ital called *Posidonia* by Sybarite colonist VI. cent. B.C.; made Rom. colony ar named *Paestum* 273 B.C., Christia bishopric; deserted during Muhamm dan invasions; magnificent ruins, wi famous temple of Poseidon.

PAEZ, JOSE ANTONIO, (1790-1873 a South American patriot, *b.* in Ven zuela. He took a leading part in th movement which won the independen of Colombia in 1821. In 1829 he r volted against Bolivar and became fir President of Venezuela. He died in e ile in New York in 1873.

PAGANINI, NICOLO (1784-1840 Ital. violin virtuoso, remarkable for

technique still unsurpassed. He traveled widely, and his astonishing feats gave rise to many weird legends; known also as a composer for his instrument.

PAGANS, the name of the worshippers of many gods, the general term applied to the heathen. They were so called because after Christianity had become predominant in the cities, the ancient faith still lingered in the villages, or pagi, and country districts.

PAGE, ARTHUR WILSON (1883), Editor, publisher, *b.* at Aberdeen, N. C. In 1905 graduated from Harvard College, In 1905 on the editorial staff and editor since 1913 of a magazine. Vice president of Doubleday, Page & Co.

PAGE, CARROLL SMALLEY (1843), a United States senator, *b.* at Westfield, Vt., *s.* of Russell Smith and Martha Malvina Smalley Page. He was educated at the People's Academy Morrisville, Vt., and at Lamoille Central Academy Hyde Park, Vt. After holding various important political positions including, governor of Vermont, 1890-2, he was elected United States senator in 1908 for the unexpired term of Redfield Proctor, deceased and was re-elected for the terms of, 1911-17 and 1917-23, He was also a dealer in raw calfskins, was president of the Lamoille County Savings Bank & Trust Co., also Lamoille County National Bank, and treasurer of the Hyde Park Lumber Co., etc.

PAGE, CURTIS HIDDEN (1870), an American university professor, *b.* at Greenwood, Mo., *s.* of Benjamin Greely and Martha Frances Hidden Page. He was educated at Harvard, the University of Paris and at the University of Florence. After being connected with various colleges and universities, he was professor of English literature at Northwestern University from 1909 until 1911 and then became professor of English language and literature at Dartmouth College. He was editor of *The Chief American Poets*, 1905, etc. and was university extension lecturer on English literature from 1891. In 1918 he commanded the 2d Regiment Ordnance Corps with the rank of major and in 1920 was made commanding major U. S. A.

PAGE, ELIZABETH FRY, an American authoress, *b.* at Hillsville Va., *d,* of Col. George Thomson and Mary A. A. Cooley Fry. She graduated from the Girl's High School, Atlanta, Ga. and studied music. literature and philosophy under private tutors. She married Davd Samuel Page, of Nashville, Tenn., in 1898. She began as a special writer for the Chattanooga Times in 1891 and later was editor of Southern Florist and Gardener, then associate editor of American Homes, and for six months in 1910 associated editor of Taylor-Trotwood Magazine, Nashville. She contributed to magazines, wrote several songs and was the author of *Vagabond Victor*, 1908 and *Edward MacDowell—His Works and Ideals*, 1910.

PAGE, HERMAN (1866), an American Protestant-Episcopal bishop, *b.* in Boston, Mass. He graduated from Harvard University, in 1888, and from the Episcopal Theological School, in Cambridge, Mass., in 1891, after which he was ordained a priest of the Protestant-Episcopal Church. During 1891-1900 he was in charge of the missions in the mine fields of Idaho, was rector of churches successively at Fall River, Mass., and Chicago, Ill., until 1914, when he was consecrated bishop of Spokane, Wash. In 1921 he was elected president of the Province of the Pacific.

PAGE, THOMAS NELSON (1853-1923), American lawyer. author, and diplomat. *B.* in Hanover co., Virginia, April 23, 1853. He graduated from the Washington and Lee University; studied law at the University of Virginia and admitted to the bar, practiced in the city of Richmond. The publication of his story *Marse Chan* in the Century magazine in 1884 gave him wide reputation as an author of distinction. He has been particularly successful in describing life in Virginia before, during, and after the war and in the delineation of negro character. He was among the first authors to interest northern readers in southern dialect stories. In 1913 President Wilson appointed him United States Ambassador to Italy. He served until 1921. His most important works are *In Old Virginia*, 1887; *On Newfoundland River*, 1891; *The Old South* essays, 1892; *Red Rock*, 1898; *Gordon Keith*, 1903; *Bred in the Bone*, 1904; *The Old Dominion*, 1908; *Robert E. Lee*, 1911; *The Land of the Spirit*, 1913; *The Strangers Pew*, 1914 and *Italy and the War*, 1919

PAGE, THOMAS WALKER (1867), Economist, *b.* at Cobham, Va. Attended various colleges. In 1900-1902 dean of the College of Commerce, University of California and 1903-1904 head of department of economics, University of Texas. At University of California again from 1904-1906 as professor of history and economics. Since 1906 professor of economics at the University of Virginia. In 1911-1912 a member of the United States Tariff Board. From 1914-1915 a special tax commissioner of Virginia

Member in 1918 and since 1920 chairman of the United States Tariff Commission. Wrote for scientific and literary journals. In 1917-1918 a member of various war commissions.

PAGE, WALTER GILMAN (1862), an American artist, *b.* at Boston, *s.* of Charles Jewett and Kate Chase Norcross Page. He was educated at private schools and Boston Latin School and later studied art at the Museum of Fine Arts, Boston, and also at Paris. He exhibited at he Paris Salon and also at the principal exhibitions in the United States, and has portraits in the Vermont and Massachusetts capitols. He was one of the organizers of the Public School Art League and was the author of *Interior Decoration of Schoolhouses.*

PAGE, WALTER HINES (1855-1918), American publisher, writer and diplomat; *b.* in Cary, N. C. August 15, 1855; *d.* at Pinehurst December 21, 1918. He was educated at the Randolph-Macon College, Virginia, and Johns Hopkins University, was a teacher for some years, and resigned the profession to become editor of the Forum, 1890-1895. From the last named year to 1899 he was literary adviser for the Houghton Mifflin Company, and then editor of the Atlantic Monthly, 1896-1899. With Frank Doubleday he established the Doubleday, Page & Company firm of book and periodical publishers, which founded the Worlds' Work monthly magazine, of which Mr. Page was editor, 1900-1913 and 1913-1918. President Wilson appointed him Ambassador to Great Britain, an office he filled with distinction during the most difficult periods of the World War. In 1914 Oxford University conferred the degree of D.C.L. Publications *The Rebuilding of Old Commonwealths*, 1902. His *Life and Letters* was published in 1923.

PAGEANT (M. E. *pagyn*, *padgin*, forms of Lat. *pagina*, to which *t* was added, as in other words, *e.g.* ancient).—(1) scene or act of play; so used, XIV. to XIX. cent's. (2) platform or stage of action of play; applied to the wheeled machine used by strolling players before construction of theatres. (3) any show.

All these uses appear early. (4) modern pageant, an attempt at representation of hist. events—when possible at actual scene of action—usually shows progress in history of a town, nation, or empire, an institution—*e.g.* army—or some aspect of civilisation. Many cities and towns of the United States have held pageants in commemoration of their founding. In England certain of these pageants are held every year.

PAGET OF BEAUDESERT, WILLIAM PAGET, 1ST BARON (150 63), Eng. statesman; one of chief sec of state, 1544; member of council regency app. by will of Henry VII obtained Beaudesert, with other spoil under Protectorate; Lord Privy Sea 1556-58.

PAGET, SIR GEORGE EDWARI K.C.B. (1809-92), Eng. physician; *b.* Sir James Paget (*q.v.*), ed at Charte house and Cambridge (B.A. 1831 M.D., 1838); regius prof. of Physics Cambridge, 1872; helped to develo modern medical education.

PAGET, SIR JAMES, BART. (181 99), Eng. surgeon. By 1851, when began practice as a surgeon, he was famous physiologist and pathologis his classic work, *Lectures on Surgic Pathology*, being given as a course lectures in 1847-53 and pub. in 185 Success as a surgeon soon came to hir pres. of the Royal Coll. of Surgeon 1873; retired from practice, 1878. discovered the disease of the breast ar the disease of bone which are name after him, and was the author *Clinical Lectures and Essays*, *Studies Old Case-Books*, etc.

PAGET, VIOLET, (1856), an En ish writer who resided for many yea in Italy. She wrote under the pen nan of Vernon Lee. Her works inclu many studies of Italian life in the Midd Ages.

PAGHMAN (35° N., 69° E.), sma mountainous district, Afghanistan.

PAGO-PAGO, OR PANGO-PANG a coaling station belonging, since 189 to the United States, on the S.E. coa of Tutuila in Samoa. It has an extrem ly fine harbor, and is the seat of a mi sion settlement.

PAGODA, a Portuguese word, po sibly a corruption of the Persian *bu kadah*, which means an 'idolhouse.' s a term used in the East for a templ more especially one pyramidal in shap There is a very handsome and massi P. at Tanjore, the upper portion bei an elongated and elaborately sculptur pyramid 100 ft. in length. The mo imposing and, at the same time, t most holy of the Burmese Ps. is t Shway Dagon P. at Rangoon. The belonging to the temple of Horiuji Shway Dagôn P. at Rangoon. The belonging to the temple of Horiuji Japan has only five stories; large on have as many as thirteen.

PAHARI, term applied to group Indo-Aryan dialects spoken in N. India; three main divisions—W., spok

around Simla; central, in N. of United Provinces; E., spoken in Nepal by Aryan population and called by them *Khaskura*, though frequently termed, inaccurately, *Nepali*.

PAHLAVI, PEHLEVI, a Persian form of Parthian, word used of script in which the Zoroastrian sacred writings have been transcribed.

PAIGE, SIDNEY (1880), Geologist. At Yale in 1908 took graduate work in geology but received no degree. A member of the United States Geological Survey from 1903-1907 and in 1907 geologist with the Panama Canal Commission. Since 1909 with United States Geological Survey and geologist in charge of Division of Geology since 1918. Author of *Reconnaissance in the Matanuska and Talkeetna Basins* (United States Geological Survey, 1907; *The Hanover Ore Deposits, New Mexico*, 1909; *Description of the Llano and Burnet Quadrangles Texas* 1912; *Rock-cut Surfaces in the Desert Ranges*, 1 912; *The Origin of the Turquoise in the Burro Mountains, New Mexico* 1912; *Pre-Cambrian Structure of the Northern Black Hills, South Dakota and Its Bearing on the Homestake Ore Boby*, 1913; *Description of the Silver City Quadrangle New Mexico* 1916.

PAIGNTON (50° 26′ N., 3° 35′ W.), seaside resort, Devonshire, England. Pop. 11 000.

PAILLERON, EDOUARD JULES HENRI (1834-99), Fr. dramatist; wrote great satirical comedy, *Le Monde ou l'on s'ennuie*.

PAIN.—(1) pain-sensations *e. g.* aroused by a prick or blow. The skin, except in a few small areas, contains a great number of special 'spots,' stimulation of which occasions pain-sensations. (2) an affective state, the opposite of pleasure (cf. 'painful' news); better called 'unpleasure,' or 'unpleasant feeling.'

PAIN, BARRY (1867), Eng. journalist and humorous author; pub. *In a Canadian Canoe*, 1891; *Playthings and Parodies*, 1892; *Another Englishwoman's Love Letters*, 1901; *The Gifted Family*, 1909; *One Kind and Another*, 1914; *The Problem Club* 1919, etc.

PAINE, ALBERT BIGELOW (1861), an American author and editor, *b.* at New Bedford, Mass., *s.* of Samuel E. and Mercy C. Paine. He was educated in the public schools at Xenia, Ill., and from 1899-1909 was editor of the League Department of the St. Nicholas Magazine. Author *Peanut*, 1913; *Hallow Tree Nights and Days* 1916; *The Boys' Life of Mark Twain*, 1916; *Mark Twain's Letters* 1917; *Dwellers in Arcady*, 1919; *George Fisher Baker, a Biography*, 1919; *A Short Life of Mark Twain*, 1920; *Lure of the Mediterranean*, 1921; *The Car that Went Abroad*, 1921; *In One Man's Life*, 1921 and others.

PAINE, JOHN KNOWLES (1839-1906), Composer. *B.* in Portland, Maine. Musical studies at Portland and Berlin. Was an organist in 1861 at Boston. Taught music at Harvard College, 1862. Among his compositions were: 'Mass in D', 1867; 'St. Peter, oratorio', 1873; 'Centennial Hymn', 1876; 'Symphony in C Minor', 1876; 'Overture to The Tempest' 1887; 'Overture to As You Like It', 1878; 'Spring symphony', 1880; 'An Island Fantasy' 1888. He also wrote many songs and organ compositions.

PAINE, RALPH DELAHYE (1871), an American author, *b.* at Lemont Ill., *s.* of Samuel Delahye and Elizabeth Brown Philbrook Paine. After graduating from Yale in 1894, he joined the staff of the Philadelphia Press and was war correspondent during the Cuban rebellion, the Spanisd American War and the Boaer uprising in China. In 1906 he was associate editor of Outing Magazine and during 1917 and 1918 was with the Allied Naval Forces in the war zone. In addition to contributing short stories to magazines he wrote several books, among which are: *The Corsair in the War Zone*, 1920; *First Down, Kentucly*, 1921 and *Comrades of the Rolling Ocean*, 1922.

PAINE, ROBERT TREAT (1731-1814) a signer of the Declaration of Independence, *b.* in Boston, March 11, 1731; *d.* there May 11, 1814. At the age of 18 he graduated from Harvard, studied theology, was chaplain to the New England troops, 1755, and admitted to the bar in 1759 began the practice of law in Boston. In 1770 he led in the prosecution of Preston and his men in the 'Boston Massacre' case. Member of the general assembly of the state, 1773-1774; of the provincial congress, 1774-1885 and of the Continental Congress, 1774-1778, during which period he signed the Declaration of Independence. Delegate to the State Convention that adopted the constitution 1779. Attorney-general of Massachusetts, 1780-1790; Judge of Supreme Court, 1790-1804.

PAINE, ROBERT TREAT, (1835-1910), an American Philanthropist, *b.* in Boston. He was a descendant of Robert Treat Paine, the statesman. He

took an active part in charitable work in Boston and endowed the Robert Treat Paine Association for charitable purposes.

PAINE, THOMAS (1737-1809), Eng. Theist and economist; *b.* in Norfolk of Quaker stock; sailed for Philadelphia, 1774; pub., 1776 a pamphlet entitled *Common Sense*, advocating Amer. independence, which was followed up by his *Crisis*. He returned to England in 1787, and published *The Rights of Man*, a reply to Burke. *The Age of Reason* is a plea for Theism.

PAINESVILLE, a city of Ohio, in Lake Co., of which it is the county seat. It is on the Grand River. Its industries include machine shops, foundries, flour mills, nurseries etc., Pop. (1920), 7,272.

PAINLEVÉ, PAUL (1863), Fr. statesman and scientist, Socialist-Republican in politics; was appointed minister of instruction and invention affecting national defence to the Briand cabinet (Oct. 1915); succeeded General Galliéni as minister of war; member of the War Committee; prime minister and minister of war (Sept.-Dec. 1917); president of the parliamentary aviation group, 1918; as minister of war he was accused by General Nivelle's supporters of having interfered with the Fr. offensive (April 1917), which ended in a breakdown, but made a successful defence; appointed advisory director-general to Chinese Government railways, 1920. Author of numerous scientific works and a *Life* of Nurse Cavell.

PAINTER, FRANKLIN VERZELIUS NEWTON (1852), College Professor, *b.* at Hampshire co., Virginia. In 1874 graduated from Roanoke College. Ordained Gospel Ministry in 1878. At Roanoke College as instructor from 1878-1882, professor of modern languages, 1882-1906 and since 1906 professor of education. Author of *A History of Education*, 1882; *Luther on Education*, 1889; *History of Christian Worship* (with Professor J. W. Richard) 1891; *Introduction to English Literature*, 1894; *Introduction to American Literature*, 1897; *A History of English Literature*, 1900; *Lyrical Vignettes*, 1900; *The Reformation Dawn*, 1901; *Poets of the South*, 1903; *Elementary Guide to Literary Criticism*, 1903; *Great Pedagogical Essays from Plato to Spencer*, 1905; *Poets of Virginia*, 1907; *Introduction to Bible Study*, 1911.

PAINTING. The history of painting may be said to begin with liberation of art from the magnificently decorative and dignified, but formal and lifeless style of the Byzantine mosaicists. The 13th cent. Florentine master, Cimabue, is generally credited with being the 'father of modern painting,' but his excessively rare extant works prove him to have been scarcely more than an excellent follower of the Byzantine tradition. It was his pupil, Giotto, in Florence, and Duccio, in Siena, who first broke away from this tradition and infused life into the frozen images of their predecessors. Each became the founder of a great school that tried to bring painting into closer touch with life. The medium of these early painters was *tempera—i.e.*, ground colors mixed with the yolk of eggs. Although these primitives produced many portable altar-pieces and panels they were essentially painters of frescoed wall decoration, which demands a broad treatment of flat masses of color, this color being invariably subordinated to linear design. Throughout the 13th and 14th centuries the painters worked entirely in the service of the Church.

Italian Renaissance.—In Siena the tradition of Duccio was carried on by Simone Martini, Lippo Memmi, and the Lorenzetti; but this art, which had never entirely shaken off the fetters of Byzantinism, was incapable of further developments, and by the end of the 14th cent., had fallen into stagnation and decay. To the Florentines whole worlds were left to conquer—the worlds of perspective anatomy, light and shade, movement, plastic life. But Giotto had moved too rapidly, and for a century his followers, the Giottesques, contented themselves with imitating his types and motifs without adding a new word to the artistic language. On the threshold of the Renaissance, Masaccio broke new ground by increasing the weight and volume of his figures and investing his frescoes with something of statuesque classic dignity. Others continued to build upon the foundations laid by him.

The Florentine painters of the 15th cent. were stimulated by the spirit of the revival of classic learning and by the newly awakened love of classic art. They approached Nature and all the pictorial problems with passionate curiosity. Uccello and Andrea del Castagno developed the science of perspective; Domenico Veneziano was the first Florentine to introduce the *oil technique*, which gradually was to oust the technique of tempera painting; Piero dei Francesch was the discoverer of atmosphere; the Pollaiuoli, and after them Luca Signorelli of Cortona, almost exhausted the significance of the human body in muscular action; Filipo Lippi's pupil Botticelli, was the supreme master of

expressive decorative line and rhythmic movement.

Other schools had meanwhile risen in Italy. In Padua, the great seat of learning, the erudite and travelled Squarcione had founded a school for the study of the antique, from which issued not only the great Mantegna, the most 'classic' of the Italian painters, but its influence spread over the whole of N. Italy, and became paramount at Ferrara and the surrounding cities. In Umbria, at Perugia, Fiorenzo di Lorenzo, the first of a long line of painters whose art reflects the tenderness and gentle beauty of the lovely Umbrian landscape, became the teacher of Pinturicchio and Perugino —the most typical of the Umbrian masters.

The end of the 15th and the beginning of the 16th centuries witnessed the full flowering of the Renaissance, dominated by the mighty triple constellation of Leonard da Vinci, Raphael, and Michelangelo. Further development on their lines was impossible, and where art falls into mere imitation, decline is inevitable. Leonardo's followers contented themselves with the more or less mechanical copying of their master's types and designs. Raphael and Michelangelo impressed their genius upon Rome and the greater part of Italy. The 16th cent. is the age of the *Mannerists*, or imitators of one master. Of those whose strong personality added a new note to the artistic achievement of the country are Correggio, who worked mostly at Parma, and perfected the art of *chiaroscuro*; and Andrea del Sarto, 'the perfect painter,' in Florence, where portraiture found a strong exponent in Bronzino.

The Mannerists were followed by the *Eclectics*, or imitators of many, who issued mainly from the Academy of the Caracci in Bologna. A wholesome reaction was the movement of the *Naturalists*, led by Caravaggio and Ribera, who had their headquarters in Naples, and who returned to a closer touch with Nature. After them came complete decadence, except in Venice, where the rise of painting had been tardy, but where a great decorative tradition lingered to the end of the 18th cent.

Venetian painting owed its characteristics partly to the Republic's constant intercourse with the splendor-loving East, partly to the unique atmospheric conditions of the lagoon city, which could not fail to develop that keen sense of beautifully harmonized, mellow color, which is to be found in Venetian art from the days when Jacopo Bellini and his sons, Giovanni and Gentile Bellini, founded the school from which were to issue such masters as Giorgione, Palma, and Titian, through the late 16th cent., which could boast a Tintoretto and a Paolo Veronese, to Tiepolo, the brilliant and facile decorator who held undisputed sway in the 18th cent.

Flemish School.—In the north, in Flanders, the art of painting did not reach perfection by a process of gradual evolution, as in Italy. It sprang from a flourishing school of miniaturists and illuminators, fully fledged, as Minerva issued in full armor from the head of Jupiter. The first masters of whom we have definite knowledge, the brothers Van Eyck (born in the second half of the 16th cent.), who are known as the inventors of *oil painting*, represent the highest achievement of the early Flem. school. Technical perfection, exquisite finish, painstaking precision in the rendering of the minutest details of costume, types, arch. and landscape, could not go further. Yet, whilst every touch was guided by close study of actuality, the realism of the Van Eycks and their followers at Bruges—Memling and Gerard David—or of the Tournai master, Robert Campin, and of his pupils, Rogier van der Weyden and Jacques Daret, was anything but photographic. Their works are charged with tender feeling, poetry, and symbolism, and have a wonderful rhythm of design and pure, brilliant color.

Towards the end of the 15th cent., when Bruges had lost its political importance and Antwerp had become the chief centre of commercial activity, the artistic hegemony, too, passed from Bruges to Antwerp, where Quentin Matsys became the founder of an important school. But already with Mabuse, who died in 1532, and even more with Barend van Orley, a pupil of Raphael, the national tradition was sacrificed to the mannered imitation of the later Italians, until new life was infused into Flem. painting, towards the end of the 15th cent., by Rubens, a true son of his race. His pictures, which represent the Flemish taste and the Flemish character of his period, have extraordinary vitality and movement. As a painter of the nude he stands unrivalled. He had a whole army of assistants, who continued to work in his manner, but of whom only few were destined to rise to greatness. Chief among them was Van Dyck, who became the favorite painter of Charles I. and his court, and who in this capacity exercised an enormous influence upon the art of portraiture in England. But the towering genius of Rubens was as fatal for Flem. art as Raphael's and Michelangelo's had been for Ital. art. It created a generation of accomplished imitators, and stayed the normal course of slow evolution.

Holland.—The early art of Holland

is almost merged with that of the primitive Flemings. The Reformation and the War of Independence waged against Spain retarded progress and were inimical to the fostering of the arts. But with peace art became democratic; it entered the citizen's home. The 17th cent. in Holland witnessed the rise of landscape and of genre painting, of still-life, and of civic portraiture. Excepting Rembrandt, the greatest of all Northern masters, a magician of golden light and mysterious shade, an artist whose profound human sympathy with all life made him probe the full significance of the visible world, the Dutchmen were, above all, realists. The 'small masters'—Terburg, Vermeer, Jan Steen, Dow Metsu, and their kin—were the discoverers of indoor atmosphere, and delighted in expressing the material beauty of all manner of textures. Landscape was raised to the dignity of a subject worthy of being painted for its own sake, and not as a mere background, by Hobbema, Ruysdael, and their followers. Paul Potter, Cuyp, and others devoted themselves to animal painting, whilst a whole band of able craftsmen, fascinated by the surface qualities of flowers, fruit, and inanimate objects, confined their attention to still-life. The 18th cent. in Holland was a period of stagnation.

Germany.—In Germany local schools were flourishing as far back as the 14th cent., though most of the painters' names are unknown to fame. Such schools arose in the Rhineland, at Cologne, Augsburg, and Prague. The early Ger. painters lacked the classic rhythm and beauty of the early Italians. This characteristic absence of a real sense of pure beauty clung to the school even in later ages. Albert Dürer himself, 1471-1528 is no exception to the rule. He is intensely dramatic and serious, simple and direct, and combines in his work all the qualities that mark the Ger. Renaissance, a movement which was intellectual and moral rather than artistic. A keener sense of beauty, stimulated by contact with Ital. art, was the gift of Holbein, whose noble style, while retaining the typical Ger. quality of careful minute observation, had none of the taint of Ger. ugliness, and was marked by sympathetic insight into character. Holbein became court painter to Henry VIII. of England, and gave the impetus to the great school of miniature painting that was to arise in that country.

France.—The early art of France was ruled by the contending influences of the Flemings and the Italians. Indeed, nearly all the early painters were of foreign, mostly of Flem., birth. The first great master of Fr. birth was the illuminator Jean Fouquet. In the 16th cent. the leading figures in Fr. art were Jean and Francois Clouet, whose exquisite portraits are closely allied to the style of Holbein. In 1531 Francois I. called to France the Italians Primaticcio and Rosso, who started the school of Fontainebleau, thus introducing the Italianizing tendencies from which Fr. art was to suffer for two centuries, during which most painters, including the great Poussin and the landscape painter Claude Lorrain, received their training in Rome. In the pompous age of Louis XIV. the official Italianizing school, presided over by Le Brun, ruled with autocratic sway, but under the following reigns the decoration of the boudoir rather than the stateroom became the painters' chief object. Watteau, the great painter of the *fetes galantes*, determined the direction of the Fr. *rococo* which broke away from formal classicism, and devoted itself to the decorative rendering of the artificial, pseudobucolic life of the ruling classes, which gradually degenerated into coarse suggestiveness. Boucher and Fragonard must be mentioned among the great Fr. masters of the 18th cent.

Spain.—In Spain, individual expression was from the outset handicapped by the strict censorship of the Church and the Inquisition. Dominated during the 15th cent. by Flem. and during the 16th cent. by Ital. influences, Span. painting never entirely ceased to retain its national characteristics of intense seriousness and sombreness. Span. painting first rose to great achievement at Seville, which produced in the first half of the 17th cent. the two greatest masters of the Span. school—Velazquez, the first real impressionist portrait painter, and a very magician of the brush, unrivalled in the atmospheric truth of his tone-values; and Murillo, 'the embodied expression of Span. Catholicism.'

The tradition of Velazquez was carried on at Madrid by a generation of painters who, like his son-in-law, J. B. del Mazo, had come under the spell of his genius. Then followed a complete eclipse of the Span. genius, until the versatile Goya, 1746-1828 made the national spirit flare up in a bright flame for a brief while. He was not only a painter, but a brilliant etcher and lithographer, and a great satirist.

Britain.—Eng. art was entirely under the domination of foreign schools until with Hogarth, 1697-1764, arose a painter whose robust, healthy style created a truly Eng. and democratic art, to oppose the essentially aristocratic art of the masters that had been called to the

Eng. court from abroad—from Holbein to Van Dyck, Lely, Kneller, Moro, Mytens, Largilliére, and many others. Hogarth, it is true, put his art to the service of his self-imposed mission as a preacher of morality, but in his painted sermons and anecdotes purely artistic considerations are never sacrificed to literary interest. The efflorescence of Brit. portrait-painting belongs to the second half of the 18th cent., and was headed by Gainsborough and Reynolds. Gainsborough based his style on the cool elegance of Van Dyck, and became the painter of all that was refined and dandified in Eng. society of that period. He delighted in cool harmonies of color, and his best work is distinguished by a feathery looseness of touch. Reynolds drew his inspiration from the Venetians, the Bolognese, and, above all, from Rembrandt. He was an eclectic who for ever preached the 'grand manner,' but was at his best when he forgot his theories and devoted himself to straightforward portraiture. One of the greatest British masters of portrait-painting, whose true merit has only comparatively lately found due acknowledgement, was the Scotsman Raeburn, who exceeded all his contemporaries in virility of brushwork and incisiveness of characterization. He is the father of the modern Scot. school of portraiture. On a much lower plane is Romney, whose pleasing paintings of pretty women follow a rather mechanical convention and are lacking in character and sincerity.

The Royal Academy was founded in 1768, with Reynolds as first president. His advocacy of eclecticism, and his encouragement of the imitation of the Bolognese with their bituminous shadows, laid the foundarion to the decline of the school, which, however, continued to excel in portraiture, and produced such distinguished painters as Hoppner, Opie, and Lawrence. The early Eng. landscape painters, notably those of the *Norwich School*, of which John Crome was the head, based their art on that of the Dutch school. A special branch of landscape, combined with animal and sporting life, was cultivated by G. Morland and J. Ward.

The significant movements of 19th cent. art, which are almost exclusively confined to France and England, was a constant struggle between classicism, or the pursuit of an arbitrarily imposed ideal of classic beauty, and a more naturalistic conception of painting. Classicism began to choke the free development in France during the First Empire under the lead of Louis David, who reflected the spirit of the Revolution and of the Napoleonic era by turning to the history and art of ancient Rome for his inspiration. His pupil, Ingres, one of the world's greatest draughtsmen, but a cold, formal painter, became the head of the *Classicist School*, against which the *Romanticists* under Delacroix rose in revolt. Apart from romantic subject-matter, Delacroix and his followers, basing their style upon Rubens and the Venetian colorists, instead of Raphael and Gr. sculpture, restored a new vitality to the art.

In England, too, the early part of the 19th cent. was marked by complete exhaustion, although with Constable arose a new school of landscape painting. Constable may be called the discoverer of the landscape in movement. He exercised an enormous influence not only upon Delacroix, but upon the Fr. painters of the thirties, who became known as the 'Barbizon school.' Among the masters of this school were the lyric ist, Corot; the epic poet of nature, Millet; the animal painters, Troyon and Jacque; Diaz, who connects the Barbizon school with the Romanticists, Daubigny and Rousseau.

The next school that revolted against the classicism which remained the official art of France were the *Realists*, headed by Courbet, whose chief dogma was that it does not matter *what* you paint, as long as it is well painted. The *Impressionists* headed by Monet, again were inspired by an Eng. master, Turner. The impressionists based their technique on their scientific knowledge of spectral analysis, dividing light into its constituents, the pure colors of the spectrum. Another group of impressionists, led by Manet, devoted themselves to the representation of contemporary life. The influence of the impressionists has been enormous, and has permeated the art of every country. In England, Whistler was among its chief exponents.

All these movements sailed under the flag of a return to nature from the artificialities of eclectic academic art. The same claim was made for the Eng. *Pre-Raphaelites*, the chief among whom were Holman Hunt, Millais, and Rossetti, but the realism of this Eng. group consisted in a minute rendering of details, sometimes at the loss of the more important general truth. Their chief merit is that they cleared the palette of Eng. painters of its bituminous dreariness, and introduced something of the sincere spirit of the early primitives.

Modern Tendencies—Towards the end of the cent., European art represents a chaotic confusion of the most varied tendencies and a loss of national characteristics, caused perhaps by easier means of communication and international exchange of ideas. Dissatisfaction with the convention of traditional methods,

and with an art that is tied to the more or less faithful representation of superficial facts, and the recognition of the impossibility to carry the illusion of reality farther than it had been carried by the different modern realistic groups, finally led to the rather archaistic movement of the so-called *Post-Impressionists*, originated by Cézanne, von Gogh, and Gauguin. Their art is essentially synthetic, and not imitative or representative. It is claimed for them that they probe the real significance of things, instead of being satisfied with representing their mere outward appearance. In this they have much in common with the painters of China and Japan, from whom they differ, however, in so far as they adopted a coarse, unbeautiful technique, far removed from the calligraphic suppleness of Eastern art. The most extreme groups of these modernists are the *Cubists* and the *Futurists*, whose pictures and intentions are utterly incomprehensible without lengthy printed explanations.

American Painting.—The earlier school of American painting was chiefly devoted to portraiture. The great names include Benjamin West, Gilbert Stuart, John S. Copley, and Rembrandt Peale, father and son. To the work of these men and others we are indebted for portraits of many of the most famous persons of the earlier history of the nation. A significant development of American art was the work of the so-called Hudson River school, those whose work was associated largely with landscape painting along the Hudson River. A good many of these artists were of a high order of merit but partake of the qualities of the early and mid-Victorian paintings. In more modern times American painting has fully kept pace with the development of art in other countries. Three of the most eminent artists of modern times, James McNeill Whistler, John S. Sargent and Henry E. Abbey, were Americans, although their best work was done abroad. To these may be added Winslow Homer, Eastman Johnson, Ralph Blakelock, William M. Chase and others who did much to bring the work of American artists into high repute. Their standard has been well maintained by their successors, among whom may be mentioned Ernest Lawson, Gardiner Symons, Cecilia Beaux, E. L. Blumenschien, Jonas Lie, and Bessie Potter Vonnoh.

The principal American institution of painting is the National Academy. See ACADEMY OF DESIGN, NATIONAL. Among the other institutions are the Art Institute of Chicago, Pennsylvania Academy and the Carnegie Institute of Pittsburgh. Nearly all the large cities have museums in which are placed works of the modern school as well as those of the older masters. The Metropolitan Museum of Art is one of the great instutitions of the world. The Boston Museum and the Freer Museum of Washington also rank among the first.

PAINTS, liquids applied for decorative purposes; prepared by mixing color-powders or pigments (generally chromates or oxides) with oil or varnish, which is heated and rendered more absorbent by some metallic salt such as zinc sulphate or litharge. House-painters' colors generally consist of oil, white lead, and pigment, with turpentine added to 'thin' mixture. Artists' colors are much finer than common p., vehicle used being linseed oil, camphor, and amber resin mixed at high temperature.

Varnishes are resinous liquids hardened by heating; give protective coating; used separately or to form enamel paints.

PAISH, SIR GEORGE (1867) Brit. economist; pub. *Railways in Great Britain* 1904; *Railroads of U. S.*, 1913; *Savings and the Social Welfare*, 1911; *A Permanent League of Nations*, 1918, etc.

PAISIELLO, GIOVANNI (1741-1816), Ital. composer; *b.* Tarento; studied under Durante, Napies; best operas, *L'Idolo Cinese, Il Barbiere di Siviglia, La Molinara*; church and chamber music.

PAISLEY (55° 51′ N., 4° 26′ W.), parliamentary burgh, river port, and seat of important manufactures in Renfrewshire, Scotland; on White Cart River near its junction with Clyde; consists of old town, new town, and suburbs; possesses old XII.-cent, Abbey, founded *c.* 1163, and numerous public buildings. Industries include dyeing, bleaching, engineering, weaving, founding, brewing, distilling, tanning, shipbuilding and manufacture of cotton thread, starch, soap, corn-flour and preserves. Pop. 85 000.

PAITA, PAYTA (5° S., 81° 7′ W.), seaport, Puira, Peru, S. America; exports cotton. Pop. 4,500.

PAJOL, CLAUDE PIERRE, COUNT (1772-1844), Fr. soldier; fought in revolutionary armies from 1791; adhered to Napoleon in 'Hundred Days'; peer of France, 1815.

PAKHOI, PEIHAI (21° 32′ N., 109° 17′ E.), treaty port, on Gulf of Tongking, China. Pop. 1921, 20,000.

PAKOKKU (21° 42′ N., 95° 7′ E.) capital of Pakokku district, Upper Burma; commercial centre; ship-building yards. Pop. 12,000; (dist.) 365,000.

PALACE, official residence of a sovereign, abp., or bp.; any magnificent abode or building, as Ital. *palazzo*, Fr. *palais*; derived from *Palatium*, Augustus's residence on Palatine Hill; a place of amusement, cf. *gin. p.*, *picture p.*

PALÆOBOTANY may be looked upon as a branch of botany dealing with the structure, affinities, and distribution in time and space of fossil vegetable remains. These remains usually occur in a fragmentary condition, and may be preserved in a variety of ways as impressions of the external structure. Internal structure is provided by petrifactions in which the whole of the plant tissues are thoroughly penetrated with calcium carbonate or silica. In Palaeozoic times the flora included a large group of fern-like forms and conifers belonging to families now extinct. The most interesting epoch was the Carboniferous, with its gymnosperms and vascular cryptogams—giant horsetails, club mosses (*e.g.*, Lepidodendron), and ferns (Filicales). In Permian times modifying conditions appear. Though a few forms persisted into the Mesozoic period, a new series of plants—the cycads, ginkgo, and conifers—dominate the period. Tertiary times are marked by the sudden appearance and almost immediate dominance of the angiosperms, many of which are closely allied to modern species. Cycads, ferns, and conifers predominate to begin with, but in the Miocene period the flora approximated more nearly to that of the present.

PALÆOGRAPHY, science of anc. handwriting. Stone and metals were used in early times for the reception of writing, but were early appropriated to inscriptions; leaves are used in the East; bark (Lat. *liber*) gave its name to Lat. book; the Teutonic book, *Buch*, is derived from beech, the wood of which is specially suitable for inscription and the Egyptian papyrus is one of the great historic writing materials. Linen was also used in Egypt, but the papyrus rolls appear in the earliest sculptures and are extant from the third millennium. *Papyrus* superseded skins in Greece in the 5th cent. B.C. or earlier, and is said to have been introduced into Italy in the 2nd cent. B.C.; it was manufactured in Egypt until the 10th cent. A.D., and used until that time for ephemeral matter throughout Europe.

Skins have a long history as writing materials, and when the discovery was made by which the skin was turned into *vellum* it slowly displaced the papyrus. The discovery, according to tradition, was made at Pergamum in the first half of 2nd cent., B. C.; hence name *parchment*. Shortly afterwards it was introduced into Rome. Papyrus, however, was used throughout the Dark Ages, and the ancient custom of using waxen *tablets* continued among the Greeks and Romans until the 4th cent. A.D. The Romans used vellum largely for backing books, but in the Middle Ages this material became the literary writing material; it is still the material for legal title deeds, etc. Paper was used from 9th cent. A.D. onwards, and came into general use in the 14th cent.

The Greeks and Romans used the stylus for writing on wax tablets, etc., the reed (*calamus*) for the papyrus. No mention of the quill (*penna*) is found until the 5th cent. A.D. *Ink* of various colors and ingredients had been used from Egyptian times, and black has always been the usual color. A MS. written over an obliterated MS. is called a *palimpsest*; often valuable class. texts have been deciphered under mediaeval writings.

The class, *roll*, the first form of book, is composed of various membranes fastened together, following one after the other as the script is unrolled; the wax tablets, however, were joined like the leaves of a modern book, and received the name *codex*, applied later to the vellum books made in a similar way, a way which speedily became universal, although legal documents of a certain nature have been enrolled right down to modern times, a method which in fact, gave its name of the Rolls to the old Record Office. *Diploma*, the folded membrane of the early codices, has given the Fr. word *diplomatique* (the moden Lat. *res diplomaticus*); the single sheet was called leaf (*folium*). The system of columns, called pages (*paginoe*), went back to class. times. The *Codices* of the Dark Ages very often employed triple columns.

Writing from right to left is the custom of Semitic nations, and is found in the first Gr. remains. The practice of separating words by a blank was established in the 9th-11th cent. The titles, placed at the end of the roll, as a colophon, in class. literature, commenced in the Middle Ages to appear at the heads of books, and were for long smaller than the text. The paragraph was marked by the Greeks, and the first letter thereof enlarged and a system of punctuation evolved. Both Gr. and Lat. MSS. are divided into the two main classes of *book-hand* and *cursive*—everyday writing. The book-hand was the special sort of legible and decorative handwriting used before the invention of printing for much-valued books and books intended for sale. It is judged, *a priori*, to have developed out of the cursive. Both have a separate history of devel-

opment. Gr. and Lat. MSS. may also be classified as in *majuscules* (large letters) or *minuscules* (small letters), and the majuscules are either capitals or uncials, the former having a square, the latter a curved shape. The history of the word *uncial* is not known, but it was employed in this way in common speech in the Dark Ages. Lat. capitals have also a less square form, called *rustic*, and Lat. palaeography developed styles of 'half' and 'mixed' uncial. Nearly all literary documents were written in majuscules until the 9th cent.

Greek MSS.—Gr. manuscripts of an early period (1st cent. B. C. or 1st cent. A.D.) were found in excavations at Herculaneum in 1752, but no more have been found in class. territory, despite the numerous modern diggings. A great number of those that have survived have been conserved in Egyptian tombs and belong to the periods of Macedonian and Roman supremacy over Egypt; while the rest, later examples, belong to the Byzantine Empire, which had its seat at Constantinople and kept Gr. culture alive throughout the Middle Ages.

In the earliest specimens, many of the capitals (A, E, I, O; B, K, M, N, T, X, and the rudimentary form of S) of our present alphabet are present. The second Gr. period, which began in A.D. 284, was chiefly marked by the development of long heads and tails to the letters. Many of these MSS. are not from the tombs, but from the old libraries of Europe. Three vellum codices of the Bible, in Gr. uncials of the 4th and 5th cents., are now known by the places of their compilation or assigned creation, as *Codex Vaticanus*, *Codex Sinaiticus* and *Codex Alexandrinus*. These, the palimpsest *Ephroemi Syri resciptus* of the 5th cent., and the *Codex Bezoe* of the 6th cent., are the 'five great uncials.' The Byzantine munuscule hands which became literary scripts in the 9th cent. have been classed as *coices vetustissimi* (9th-10th cent.), *codices vetusti* (10th-13th cent.), *codices recentiores* (13th cent. to 1453). *codices novelli* (later than 1453), the end of the Graeco-Roman empire).

Latin MSS.—As it first appears in the 1st cent. A.D. in Roman tablets, an occasional papyrus, and the wall scratchings (*graffiti*) at Herculaneum and Pompeii, the *Lat. cursive* is easily seen to be the parent of our modern handwriting; several of our small letters stand there in a medley with our present capitals, though many of these letters have since undergone revolutions. In the book-hands, however, the rustic capitals often employed from the 1st to the 6th cent, are very nearly the same as our present capitals.

Mediaeval MSS.—The barbarians who overran the Roman Empire and built up our modern nations adopted the Roman script and developed it in their different ways. As first they devoted themselves, not to literary products, but to working out useful cursive scripts from which, later, new book-hands were made. After the acceptance of Christianity, handsome religious books were in demand. Ireland produced among other famous MSS., the *Book of Kells*, in half-uncials of the 7th cent., with the beautiful illuminations which were the mediaeval contribution to palaeography; and England, who learned het script chiefly from her Irish missionaries, produced the uncial Bible of Jarrow (*c.* 700), half-uncial Lindisfarne Gospels (of the same period) Bede's *Historia Ecclesiastic* (8th cent.), and the *Liber Vitoe* of Durham (9th cent.).

Irish writing gave way to French in England at the Norman Conquest. Fr. writing owed much to Charlemagne's renaissance. He ordered the production of sumptuous books, and his helper, Alcuin of York, started a school of calligraphy at Tours, wdere he was abbot 796-804.

The book-hand of the 15th cent. was adopted by the first printing-presses, through the Ital. printers soon turned back to models of the 12th cent., which was considered the great age of handwriting. Extensive contractions have been used from Gr. times in all cursive hands for economy of time and space, and an elaborate system of abbreviations was evolved in the Middle Ages.

PALÆONTOLOGY (Gr. *palaios*, ancient'; *on*, *ontos*, 'being'; *logos*, 'science'), the science which reads in fossils the history of the past and endeavors to trace from them the story of life's progress in the world. That branch which deals with fossil animals is known as Palaeozoology, that with plants as Palaeobotany.

To earlier observers *fossils* presented great difficulties. The two main theories which for many centuries held sway were that they were sports of nature with no more meaning than a mineral crystal, or that, as Xenophanes suggested about 500 B.C., they actually represented the remains of entombed animals. Many centuries passed before universal recognition was given to fossils as the remains of living things, but Werner, 1750-1817 first suggested that by their aid different geological formations could be recognized.

But palaeontology as a science began with Cuvier and Lamarck, both of whom described many fossil remains and showed their relationships with living

animals. At the same time William Smith, 'the father of Eng. geology,' had observed in England that in different rock layers different series of fossils were preserved. One cannat pass over unmentioned the magnificent work accomplished for palaeontology by Richard Owen 1804-93, and by Louis Agassaz, 1807-73, and for palaeobotany by Brongniart in 1828. New life was given to the researches of palaeontologists by Darwin's evolution theory, and since his time innumerable workers have entered the field.

Palaeontology has accomplished much for her sister sciences of geology, botany, and zoology. She has helped to fill in our pictures of the world in ages long dead. From the nature of the fossil animals and plants discovered aro revealed some of the conditions of their lives; whether they lived in fresh water or in the sea, in marshy places or on dry land, and still more in detail, even whether they lived in the abysses of ocean or in shallow water. Furthermore, fossils of the same kind found in different places indicate that similar conditions prevailed, and often that the rocks in which they occur were formed at the same time.

To the biologist results are even more interesting and more important. Occasionally a missing link is found—the toothed bird Archaeopteryx, which, distinctly avian, shows evidence of descent from reptile stock; or an extinct group may help to fill a gap in the table of descent—the reptilian Dinosaurs of Mesozoic times possess characters which point to the coming of birds. Thus palaeontology illumines the history of life and sheds its own light upon the evolution of living things. Close study has shown that even in limited periods evolution has been at work—for example, pond snails (*Viviparus* or *Paludina*), found in the lowest and highest layers of the Pliocene deposits of Slavonia, appear to be distinct species, but specimens from the intermediate layers show that by gradual steps the highest form developed from the lowest. Another well-known exmaple is that furnished by the horse and its ancestors. These in early Tertiary times at first possessed five toes, but were succeeded by species in which the number of toes was gradually reduced until at the end of the series representatives of our domesticated horse (*Equus*) appear in Pliocene depsoits with only one toe.

A wider view gives further support to the theory of organic evolution. Zoologists, on grounds of the complexity and integration of their structures, place in ascending order fishes, amphibians, reptiles, and birds. This is exactly the order in which those groups first appear as fossils.

PALÆOZOIC ERA, the lowest division of fossiliferous rocks; contain the remains of the earliest forms of life. They are also known as Primary Rocks, and are divided into groups—Permian, Carboniferous, Devonian, Old Red Sandstone, Silurian, Cambrian. See GEOLOGY.

PALAFOX Y MELZI, JOSÉ DE (1780-1847), Duke of Saragossa, and grandee of Spain, 1836; famed for heroic defence of Saragossa against French, 1808-9; languished in Fr. dungeons till 1813; captain-gen. of Aragon, 1813.

PALAIS ROYAL, the name originally given to a palace in Paris built by Richelieu and presented by him to Louis XIII. It was confiscated by the Republicans in 1793 and was afterwards purchased by the Duke of Orleans. It was burned by the Communists in 1871 but was restored. It is now a popular resort of Parisians.

PALAMAU (23° 52′ N.; 83° 57′ E.), district, Chota-Nagpur, Bihar and Orissa, India, coal mines. Pop. 625,000.

PALAMCOTTAH (8° 42′ N., 77° 46′ E.) town, Tinnevelly Madras, India; mission station. Pop. 21,000.

PALAMEDES (classical myth.); prince of Nauplia; stoned to death by Odysseus at siege of Troy.

PALANPUR, PAHLANPUR (24° 12′ N., 72° 28′ E.), native state, Gujarat, Bombay, India. Pop, 225,000.

PALANQUIN, a covered conveyance used in India, China and other Oriental countries. It is borne on the shoulders of men by means of poles. A Palanquin is about 8 feet long, 4 feet wide and 4 feet high. The introduction of railways and the improvement of the roads have rendered it obsolete in India.

PALATE, the roof of the mouth. It is composed of the *hard palate*, a bony structure covered with mucous membrane, and the *soft palate*, an aggregation of muscles covered with mucous membrane. The hard P. is formed by the palatine processes of the superior maxillary bones and the palatal bones. It has a slight ridge called the *palatine raphe* in the middle line which ends anteriorly in a little eminence called the *palatine papilla*; a number of ridges run transversely across the anterior portion of the P. The soft P. is composed of the muscles known as *tensor palati*, *azygos uvuloe*, *palatoglossus* and *palatopharyngeus*. A soft projection known as the *uvula* hangs downwards at the rear of the oral cavity,

PALATINATE, PFALZ (9° 30′ N., 80° E.), part of Bavaria, Germany. The Palatinate (also called *Rheinpfalz* or *Rheinbayern*) is bounded by Hessian province of Rhein-Hessen, Baden, Alsace-Lorraine, and Prussian Rhine Province; leading town, Spires; most important rivers are Rhine and Lauter; soil very fertile and produces corn, flax, fruits and vegetables in large quantities; principal minerals are coal, iron, quicksilver, and salt. In old Germany P. was much larger region, ruled by a count palatine; two capitals were Heidelberg and Mannheim. Upper and Lower P. disjoined after Thirty Years War, when Upper P. (*Oberpfalz*) fell into hands of Bavaria; manufactures include machinery, chemicals, paper, beer, leather, and tobacco; cattle-rearing carried on. Area of Palatinate, 2,289 sq. miles. Pop. 1920, 957,300. Area of Upper Palatinate (which lies in E. Bavaria on the Bohemian border; capital, Regensburg), 3,728 sq. miles. Pop. 1920, 611,720.

PALATINE, PALATINUS MONS, largest of the seven hills on which Rome was built. Here Romulus laid the foundations for his city *Roma Quadrata.* There was a temple of Apollo on the P., and this temple Augustus rebult and founded therein a public library with a fine collection of Gk. and Rom. MSS.

PALATKA, a city of Florida, in Putnam co., of which it is the county seat. It is on the west bank of the St. Johns River and has steamship connection with points on the Atlantic coast. It has a considerable trade in fruit, sugar and cotton, and has iron and machine shops. Pop. 1920, 5,102.

PALAWAN, an Island on the north-east Coast of Borneo, belonging to the to the Philippines. It has an area of 4,576 square miles, with a population chiefly of Malays of about 30,000.

PALAZZOLO ACREIDE (37° 3′ N., 14° 55′ E.), town, Syracuse, Sicily. Pop. 15,500.

PALE, THE, or **THE ENGLISH PALE,** the name applied to that part of Ireland in which English law was acknowledged. The dominion of England was for some centuries after the conquest of Ireland by Henry II. restricted to the P., the boundaries of which varied. The name is given also to those parts of Russia and other European countries in which Jews are permitted to reside.

PALEMBANG (2° 46′ S., 104° 50′ E.), capital, P. residency, Sumatra; seaport; cotton, pepper, silk, dye-woods; great trading centre in Middle Ages. Pop. 60,200.

PALENCIA.—(1) (42° 30′ N., 4° 30′ W.), province, Old Castile, Spain; mountainous in N.; chief rivers, Pisquerga and Carrion; produces grain, wine. Pop. 1920, 196,556. (2) (42° 2′ N. 4° 26′ W.), city, capital of above on Carrion; cathedral; woolens. Pop, 16,500.

PALENQUÉ, name given to ruined Mexican city; known to Spaniards from 1750, but not explored till modern times; possibly *Xibalba,* the mythical city of the Mayas.

PALERMO, city, cap. of Sicily (38° 7′ N., 13° 22′ E.), on N. coast facing Ital. mainland; important seaport in sheltered bay; beautifully situated in fertile valley (Conca d'Oro) partly surrounded by mountains; chief products are machinery, chemicals, sumach, essences, sulphur, tartar, wine, green and dry fruits, tobacco. Notable features are fine cathedral, 1169-85; San Giovanni degli Eremiti, 1132; La Martorana 1143; Santa Maria della Catena; royal palace with beautiful Capella Palatina; Chiaramonte (Lo Steri 1307), Bruiccia, Abetelli, and numerous other palaces; univ., 1805; Museo Nationale (with celebrated metopes from the temples of Selinunt), libraries, town-house, theatres, and old gateways. Founded by Phoenicians; conquered by Carthaginians, Romans, Saracens, and Normans, 1071; then cap. of kindgom of Sicily; captured by Garibaldi, 1860; and annexed to Sardinia. Pop. 345,900. The province of Palermo is largely mountainous. Area, 1,948 sq. m. pop. *c.* 804,600.

PALESTINE, country, W. Asia (31°-33° N., 34° 20′-36° E.); name specially designates area between anc. Dan and Beersheba and beyond Jordan; extreme length, 145 m.; average breadth W. of Jordan, 40 m. It has been called by many names—'Land of Israel,' 'Land of Canaan,' 'Holy Land,' etc. Country may be divided into (1) plain of Philistia, Sharon etc., broken only by Mount Carmel, bordering Levant; (2) hilly country of Judah, Samaria, and Galilee, intersected by many deep, water-cut ravines, and culminating in Jebel Jermuk, 3,934 ft. above Mediterranean; (3) the Jordan rift-valley, El Ghor, containing the Dead Sea, 1,292 ft. below Mediterranean and with maximum depth of 1,308 ft.; (4) the tableland of Arabia, generally 2,000 ft. high and attaining extreme height of 4,245 ft., sloping abruptly on W., more gradually to E. Principal rivers are Jordan, rising in valley of Lebanon and passing through waters of Merom and Sea of Galilee into Dead Sea; Kishon (Nahr el Makutta) draining Plain of Esdraelon between Samaria and Galilee; Yarmuk draining

MODERN
PALESTINE
SCALE OF MILES
0 5 10 20 30
Railroads
Biblical names are in parentheses.—(Bethlehem) (R. Jordan)
The World Syndicate Company, Inc., N.Y.
MEDITERRANEAN SEA
DEAD SEA
BAHR LUT
PEREA
BETHLEHEM
EL HAURAN
EL BELKA
EL KUDS
(Jerusalem)
EXPLANATION OF COLORING
Above 6000 feet
Level of Mediterranean Sea
Level of Dead Sea
Longitude East from Greenwich

Hauran plateau, and entering Jordan on E.; Jabbok (Zerka), trib. of Jordan; Arnon (Mojib), entering Dead Sea. The Brook Kedron is generally dry. Lakes are Merom, Sea of Galilee, and Dead Sea. Cap. Jerusalem.

The Sinaitic Mts. are composed chiefly of crystallines, which are of Archaean age; to the N. these are covered by sandstone and limestone deposits of Carboniferous age; the coastal plain is of Pleistocene formation, and volcanic rocks are found upon the limestone tableland of Moab; the Jordan valley coincides with a displacement or fault, so that the strata to the W. have been depressed and those on the E. raised; hence the two sides are of different geological character, crystallines overlaid by sandstones and limestones being found on the E., chalks and more recent deposits on the W.

The Mediterranean climate is extremely hot in summer and very wet in winter, the rainy season lasting from Dec. to March. Characteristic trees are the olive, cedar, and sycamore; wheat, wine, olives, and many fruits are reared; sheep and goats thrive in valleys and (in dry seasons) on mountains. Railways running inland from Haifa, and from Joppa to Jerusalem are connected by line from Egyptian frontier, and one from Joppa-Jerusalem line to Plain of Esdraelon or Megiddo. See Map, Palestine.

History.—According to the earliest Egyptian and Babylonian inscriptions, Palestine was already in the 4th millenium B. C. inhabited by a Semitic race. Probably Babylonian supremacy was established towards close of 4th or beginning of 3rd millenium B.C.; an inscription of about 2920 expressly states that Lugalzaggisi of Babylon was supreme over whole region from Mediterranean to Persian Gulf. About 2500 B.C. there occurred an invasion of the Amorites, who spread over all W. Asia; a result of this was decay of Babylonia and its conquest by the Elamites. The traditional rise of the Heb. nation occurs during Elamite period, which lasted till *c.* 2230, when Khammurabi, mentioned in Genesis as Amraphel, liberated his country from Elamite control and established his authority in Palestine as well as in Babylon. This second period of Babylonian rule probably lasted till the end of the 18th cent. B.C., soon after which the country must have come under Egyptian suzerainty; and it has been suggested that it was conquered by the Hyksos prior to their invasion of Egypt.

The Egyptians retained control of Palestine until reign of Amenhotep IV. (succeeded *c.* 1392), when their power began to decline, owing partly to the king's religious reforms and partly to the invasions of warlike people from the N. The Hittites are known to have invaded Syria in Amenhotep III.'s reign, but their great conquests began in that of Amenhotep IV., when appeals from all parts of Syria and Palestine for aid against them were sent to the Pharaoh at Tellspel Amarna. After this the Hittites seem to have become predominant in the country, and they carried on a long struggle against Egypt. Eventually (*c.* 1303) they concluded a treaty with Rameses II., whereby Palestine was recognized as a prov. of Egypt. The rise of the Aramaeans was probably contemporary with that of the Hittites, whom they eventually superseded.

From the end of the 13th cent. B.C. Palestine was undisturbed by the great surrounding nations, and during a period of comparative isolation the Hebrews established their supremacy first under judges and later as a monarchy. See Jews. This kingdom soon split into the two states of Israel and Judah, whose relations were marked by three distinct periods—(1) mutual hostility and constant war; (2) alliance and combined enmity to Syria; (3) fresh disputes, and the gradual decay of both kingdoms before the increasing power of Assyria and Babylonia. Israel was eventually conquered by Assyria *c.* 722 B.C.; and after a prolonged struggle against Assyria and Egypt in turn, Judah was defeated by Nebuchadnezzar in 588; Palestine thus passed under control of the Babylonian Empire, and so remained until, with the fall of Babylon in 539 B.C., it came to the possession of Cyrus of Persia. Under the Persians a settled form of government was established by Ezra and Nehemiah; and this period was marked by the growth of organization, order, and ritual among the Jews. Pers. domination came to an end with the break up of Pers. Empire before the victorious armies of Alexander the Great, after whose death Palestine came to the hands of one of his generals, Laomedan; in 320 it was seized by Ptolemy Soter of Egypt; between 314 and 301 it was held by Antigonus of Syria, but at the latter date it reverted to the Ptolemies, and became a buffer between Egypt and Syria. After a time of struggle between the Ptolemies and the Seleucids it was taken by Antiochus the Great (*c.* 198); his successors Seleucus Philopator and Antiochus Epiphanes, persecuted the Jewish inhabitants and endeavored to hellenize the country, a policy which resulted in a national rising under Mattathias and the establishment of the Asmonaean dynasty by his son, Judas Maccabaeus. The dominion of the Asmonaeans continued till 63 B.C., when internal disputes led to the inter-

vention of the Romans; the country was then conquered by Pompey. The conduct of affairs was left to Antipater the Idumaean, who curried favor with the Romans, and whose son, Herod the Great, became king of all Judaea (40 B.C.).

During the first half of the 1st cent. A.D., Palestine passed through four distinct political phases; in the time of Herod the Great it had been a single united kingdom, but at his death (4 B.C.) it was divided up into principalities under his sons, Archelaus, Herod Antipas, and Herod Philip; before long Samaria and Judaea became a Roman prov., while Galilee, Trachonitis, and Ituraea continued under native rulers; then the former kingdom was revived for a short time under Herod Agrippa; and finally the entire country became a Roman prov. Owing to the cruel oppression of the Roman governors a great rebellion broke out in A.D. 66, but was eventually put down by Titus, and in 70 Jerusalem was utterly destroyed. After the suppression of Bar Cochba's revolt in 132-5, the new city of Ælia Capitolina was built by Hadrian on the site of Jerusalem.

Palestine remained under Roman control for several centuries, and after A.D. 395 formed part of the Byzantine Empire; it was taken early in 7th cent. by Chosroes of Persia, but was recovered by Byzantines in 629. The Saracens obtained possession of it in 636, and remained supreme for four centuries. In the 11th cent. it was taken by the Seljuk Turks, and in 1095 Peter the Hermit's exposure of the treatment to which Christian pilgrims were subjected by Mohammedans led to First Crusade; this resulted in capture of Jersualem and election of Godfrey de Bouillon as Lat. king of Jerusalem. During 12th and 13th centuries eight other crusades were carried on, and in the 13th and 14th centuries occurred the great Mongol invasions. The country was eventually captured by the Ottoman Turks in 1516, and formed part of Selim I's empire. It remained under Turk. dominion except for a short time in 19th cent., when it was held by Egypt.

By the Treaty of Peace with Turkey (signed Aug. 10, 1920) the administration of Palestine is entrusted to a mandatory (Britain), and declaration originally made (Nov. 2, 1917) by Brit. Government and adopted by Allied governments in favor of a national home for the Jewish people in Palestine is reaffirmed. Provision is also made for a special commission to study and regulate all questions and claims relating to the different religious communities. Sir Herbert Samuel was appointed High Commissioner when the British mandate was established in 1921. The years following were marked by the immigration of Jews from all lands, and the rapid improvement of the economic conditions. Area under Brit. occupation *c.* 7,000 sq. m.; pop. *c.* 600,000.

Palestine Campaign.—In the earlier stages of the World War the defence of Egypt on the E. was conducted along the line of the Suez Canal, but after failure of the second Turk. attack (Aug. 1916) it was decided to pursue the enemy across the Sinai desert and to constitute the defence in Palestine. By gradual stages the movement developed into a campaign against the Turks with a view to bringing about their general defeat and rescruing the Levantine seaboard from their dominion.

A railway was rapidly constructed along the coast route in the direction of El Arish. Before the end of Nov. two infantry divisions, the Imperial Cavalry and the Anzac mounted troops were concentrated at Mazar, and after the water supplies had been organized, moved eastwards (Dec. 20), the cavalry entering El Arish (Dec. 21), which had been evacuated by the Turks, who had fallen back on Magdhaba, a fortified post on the track to their railhead at Auja. This position was taken by a general attack (Dec. 22), the Turk. commander, Klaat Bey, and 1,200 prisoners being captured. On Jan. 8, 1916, Rafa surrendered.

No further advance took place till the following year. General Sir Archibald Murray unwillingly undertook a further advance. On March 25, 1917 the troops —cavalry camelry, artillery, and infantry—moved out across the plain towards Gaza, their immediate objective being the Wady el Ghuzze, a small stream running parallel to the frontier 5 m. S. of Gaza. It was occupied without resistance, and Sir Charles Dobell attempted to seize Gaza; it was only partially successful and Dobell decided to keep his general reserve in hand. Dobell was relieved of his command (April 21); Murray was superseded by Allenby (June 28).

Several months were occupied in improving communications, pushing forward the railway and reorganizing the troops, and in the interval the Turks under instruction of General von Falkenhayn, who had come to Aleppo, prepared a strong defensive front from Gaza to Beersheba. By a series of raids (July-Oct.) Allenby carefully gave the impression that Gaza was again the direct objective. But his strategy really envisaged a turning attack from Beersheba. This operation proved decisive; the Turks began a general retreat, and

Gaza was occupied without difficulty (Nov. 7). The same evening the British were 8 m. beyond the city. No further stand was made by the Turks till they reached Hebron and Jerusalem.

The Welsh Division entered Hebron (Dec. 6), but were held up by bad weather before Bethlehem, wdich was to be spared from damage. The London territorials cut the Shechem road, and the Welsh, turning eastwards from the Bethlehem road to the Jericho route, isolated Jerusalem. The mayor advanced to the Brit. lines under a white flag, and Allenby entered the Holy City on foot by the Jaffa Gate (Nov. 11). He went as a liberator, offering freedom of worship to all faiths. The Turks made a determined but vain attempt to recover the city. Meantime Falkenhayn had been replaced by Liman von Sanders; the pressure of the Germans on the Western front caused the 52nd and 74th Divisions to be sent to France; Ind. divisions were sent from Mesopotamia to take their place; bnt a considerable period was required for reorganization. Allenby's plan was to sweep through the coastal sector into the Plain of Esdraelon (Armageddon) by the gap at Jiljulieh, the anc. Gilgal, 10 m. in width, to shepherd the Turks towards El Afule into the arms of the cavalry, and then to push down the Vale of Jezreel to Beisan, so hemming the enemy against the Jordan. The battle began on Sept. 18. The attack, which was evidently unexpected, was immediately successful. Thrown into confusion, the enemy began to retreat, closely pursued by Australian Light Horse, Chasseurs d'Afrique, and Spahis. Chetwode now began to co-operate, and in a series of heavy engagements forced the Turks back. On the 19th the cavalry turned through the hills of Samaria into the Plain of Esdraelon at Abu Shusheh, while on the hill front the 14th Brigade turned towards El Afule, and the13th rode into Nazareth (Sept. 20). Thus all the main outlets of escape remaining to the Turk. 7th and 8th Armies had been closed. They could avoid capture only by using the tracks which run S.E. from the vicinity of Nablus to the crossings of the Jordan at Jisr ed Damieh. During the night the enemy realized his position and began to retreat. Organized resistance ceased (Sept. 21). By the evening of the 24th the 7th and 8th Turk. Armies had ceased to exist. The battle had been decisive.

Allenby then occupied Haifa, so securing another avenue of supply, and the Turk, 4th Army took to flight. Across the Jordan Amman was occupied (Sept. 24), and 5,000 Turks were caught between the British and the Arabs advancing along the railway from Maan. Already the Desert Mounted Corps had begun to move towards Damascus, and 4th and 5th Cavalry Divisions, and the Australian Mounted Division crossing the Jordan below the Sea of Galilee, were marching through Gilead towards Deraa. On Oct. 1 Damascus fell, twelve days after the opening of the battle. Three Turk. armies had been destroyed; over 60,000 prisoners and 300 guns had been taken,

The rest of the campaign is simply a chronicle of the fall of towns famous from antiquity. Tripoli was taken on Oct. 13; Homs was occupied about the same time; and Aleppo was entered by a detachment of Arabs on the 25th. Muslimie junction, on the Bagdad railway N. of the town, was seized, and Alienby was preparing to advance to Alexandretta when Turkey signed the armistice at Mudros which closed the war in the Near East (Oct. 30).

PALESTINE, a city of Texas, in Anderson co., of which it is the county seat. It is on the International and Great Western Railroad. It is the center of an extensive cotton growing and agricultural region and it has a large trade in lumber, beef, fruit and vegetables. In the vicinity are iron and salt mines. There is a public library and a court house. The city has the general offices of the Great Northern Railroad. Pop. 1920, 11,039.

PALESTRINA, GIOVANNI PIERLUIGI DA (*c.* 1524-1594), Ital. composer; *b.* at Palestrina, from which he derived his surname. He was early appointed choirmaster at the Vatican, and in 1544 wrote an epoch-making set of Masses dedicated to Pope Julius III. In 1555 he became music director at the Lateran, and in 1561 went in a similar capacity to S. Maria Maggiore. In 1563 he was officially requested to demonstrate how the secularising abuses which had crept into the music, of the Church could be reformed, and the result was the famous *Marcellus Mass,* since regarded as a classical model by the R.C. Church.

PALETTE, an oval cabinet of wood or other material used by painters for containing paint which they are using. It contains a hole at one end in which the thumb is inserted for holding it.

PALEY, WILLIAM (1743-1805), Anglican theologian and scholar; archdeacon of Carlisle, 1782; pub. *The Principles of Moral and Political Philosophy,* 1785; *Horoe Paulinoe* 1790 and *View of the Evidences of Christianity,* his most famous work, 1794; *Natural Theology,* 1902.

PALFREY, JOHN GORHAM (1796-1881), an American theological and historical writer, *b.* in Boston, Mass. He graduated from Harvard University, in 1815, studied theology and in 1818 became pastor of the Brattle St. Congregational-Unitarian Church, in Boston. In 1830 he resigned to become professor of sacred literature at Harvard, being at the same time chaplain there. He resigned in 1839 and during the following four years was editor of the North American Review. He served a term in the legislature, was secretary of state for Massachusetts and during 1861-7 was postmaster of Boston. He wrote *Evidences of Christianity*, 1843 and *A History of New England from its Discovery by Europeans to the Revolution of the Seventeenth Century*, 1866.

PALGHAT (10° 45′ N., 76° 43′ E.), town, Malabar, Madras, India. Pop. 46,000.

PALGRAVE, FRANCIS TURNER (1824-97), Eng. critic and poet; prof. of Poetry at Oxford, 1886-95. His poetical work was considerable, but he is best known by his *Golden Treasury of English Lyrics*.

PALGRAVE, SIR FRANCIS (1788-1861), Eng. historian; deputy keeper of Public Records, 1838-62, and edit. several Record Office publications.

PALI, an Ind. language, which in early times (*c.* 600-200 B.C.), was the chief speech of cultured people in N. India. It has filled for India a very similar role to that of Latin in mediaeval Europe; inscriptions, religious treatises, canon law, learned lit. were all written in Pali, besides which it exercised a profound influence on the surrounding cruder dialects. In origin Pali is closely related to Sanskrit, and thus belongs to the Indo-European group.

PALIMPSEST, a manuscript from which the original writing was washed off with a sponge or scraped so that a new writing could be superimposed. Many ancients texts have been discovered and restored from p's, *e.g.* the Vatican Cicero. See PALAEOGRAPHY.

PALINGENESIS, theory that the soul undergoes succession of rebirths.

PALISSY, BERNARD (1510-89), Fr. potter; worked for some twelve years as a glass- and portrait-painter. About 1538 he settled at Saintes as a land surveyor and shortly afterwards, determined to discover how to make enamels, he began a series of experiments which lasted sixteen years before proving successful. Fame came to him by the ware he produced, with objects in high relief, mostly colored; and he was appointed 'inventor of rustic figulines' to the king. He established a workshop in Paris in 1564; escaped the massacre of St. Bartholomew by the intervention of Catherine de'Medici; but in 1585 was thrown into the Bastile as a Huguenot, and died there.

PALITANA (20° 31′ N., 71° 53′ E.) native state, Kathiawar, Bombay, India; capital, Palitana. Pop. of state, 53,000; (town) 13,500

PALK STRAIT (10° 5′ N. 80° E.), separates India from Ceylon

PALLADIO, ANDREA, (1518-80), a famous Italian architect, *b.* at Viecnza. He studied in his native city and at Rome, at the latter of which he assisted in the building of St. Peter's, under Paul III. He was one of the greatest Italian architects of the late Renaissance, and the style which he used has received the name of Palladian. It was an attempt to revive the severity and dignity of the Roman architecture, and was learnt from Vitruvius and from a study of the Roman monuments that remained. P. greatly influenced the architecture of his day by his work, *I quattro libro dell' Architettura*, 1570, which was immediately translated into most European languages.

PALLADIUM. Pd. Atomic weight 106. A rare metal belonging to the platinum group, and found in the same ores as that metal in Russia, Brazil, California and Australia. It was first discovered in 1802. It has a specific gravity of 11.9, melts at 1594° C. and boils at 2820° C. Unlike the other platinum metals, palladium dissolves in hot nitric acid. It has the peculiar property of forming an 'alloy' with hydrogen, and the finely divided metal will absorb 900 times its own volume of the gas. It was named after the planet Pallas, which was discovered in the same year as the metal.

PALLANZA (45° 55′ N. 9° 33′ E.); town, health-resort, on Lago Maggiore, Novara, Italy. Pop. 5,600.

PALLAS ATHENE. See ATHENA.

PALLAS, PETER SIMON (1741-1811), Ger. naturalist; travelled in Kirghiz Steppes and Siberia, 1768-74, and wrote account of flora and fauna.

PALLEN, CONDÉ BENOIST (1858), an American editor and author, *b.* at St. Louis, *s.* of Montrose A. and Anne E. Benoist Pallen. He was educated at Georgetown University, and at St. Louis University. He was editor of Church Progress and the Catholic World from 1887-97, was a lecturer on literary subjects and contributed articles on philos-

ophy and literary subjects to various Catholic publications. He was Catholic revisory editor of the New International Encyclopedia and the Encyclopedia Americana and from 1904-20, was managing editor of the Catholic Encyclopedia. Author: *The Philosophy of Literature*, 1897; *The Meaning of Idylls of the King*, 1904; *Education of Boy's*, 1916 and *Crucible Island*, 1919.

PALLIUM, OR PALL, vestment bestowed by pope on adp's, who cannot act as such before it has been bestowed; it is a strip of lamb's wool, looped in front, and hanging down back and front.

PALM.—(1) in anatomy, is the inner surface of the undivided portion of the hand. (2) botanically, the palms are a group of monocotyledons mainly tropical in distribution; the majority are arborescent and unbranched (Hyphaene, the Doum Palm, branches), and bear an apical crown of leaves, which are primarily entire, but become palmately or pinnately divided, owing to the loss of the more delicate tissues. Some genera (*e.g.* Calamus, the Rattan Palm) are climbers, whilst others, such as Nipa, a swamp palm, have a very short stem and radical leaves. The inflorescence is large, and during its earlier stages is enclosed by a protective sheath or spathe. In the majority it is axillary but in a few (*e.g.* Corypha, the Talipot Palm; Metroxylon, the Sago Palm) it is terminal, and results in the death of the plant. Economic products—fibre (Cocos), oil (Cocos, Elaeis), vegetable ivory (Phytelephas), sago (Metroxylon), arecanuts, etc.

PALM BEACH, a city of Florida, in Palm Beach co. It is situated on a narrow stretch of land between Lake Worth and the Atlantic coast. Its rare climate and beautiful surroundings have assisted in its development into one of the most popular winter resorts in the world. It has magnificent hotels, many fine residences, and during the winter season has all the characteristics of an important city. During the summer months its population is small. In the vicinity are produced many tropical fruits. It is on the Florida and East Coast Railroad.

PALM OILS. See Oils.

PALM SUNDAY, the day celebrating Christ's entry into Jerusalem (the Sunday before Easter), thus called because of the carrying of palms to place them in church, though the origin of the custom is obscure. It has an elaborate ceremonial in the Rom. Church, and with it begins the mournful services of Passion Week; in the Eastern Church it is joyful; called simply 'Sunday before Easter' in Book of Common Prayer.

PALMA, SAN MIGUEL DE LA PALMA (28° 42′ N., 17° 52′ W.), one of the Canary Islands; chief town, Santa Cruz. Pop. 44,000.

PALMA (39° 35′ N., 2° 43′ E.) port, Majorca Balearic Isles; seat of bishopric; has cathedral, espiscopal and royal palaces; trades in wine, cereals, fruit, etc. Pop. 67,500.

PALMA, TOMAS ESTRADA (1835-1908), a Cuban revolutionist and first president of Cuba, *b.* in Bayamo, Santiago, Cuba. He studied law, but instead of practising became active in the revolutionary movement during 1868-78. At the end of that period he was captured by the Spaniards and imprisoned in Spain. On his release he went to Honduras, where he was Postmaster-General for a while. Finally he came to the United States and established a private school for Latin Americans at Central Valley, N. Y. In 1895 he became president of the New York Junta, and was active in raising funds and supplying arms for the new revolutionary movement in Cuba. He was elected first President of the Cuban Republic in 1901, re-elected four years later, but resigned in 1906.

PALMAS, CAPE, a headland of Liberia, W. Africa. There is an American mission station here.

PALMELLA (38° 34′ N., 8° 57′ W.), town, Estremadura, Portugal. Pop. 7,200.

PALMER, PALMER-WORM, name given to several species of destructive caterpillars; especially to that of moth *Ypsilophus pometella.*

PALMER, a town of Massachusetts, in Hampden co. It includes several villages. It is on the Central of Vermont and the Boston and Albany railroads, and on the Chicopee River. Its industries include cotton goods, foundry products, machine shop products, carpets, wire, etc. It is the seat of the Massachusetts Hospital for Epileptics. There is a public library and a Y.M.C.A. building. Pop. 1920, 9,896.

PALMER, ALEXANDER MITCHELL (1872), Ex-attorney-general of the United States. *B.* in Moosehead, Pa., May 4, 1859. He graduated from Swarthmore College, Pa. with the highest honors. A.B. LL.D. Swarthmore, Lafayette, 1919. George Washington University 1920. Admitted to the bar in 1893, he practised law with the Hon. John B. Storm until the latters death in

1901, then alone. A director of banks and industrial concerns, he was elected to represent the 26th Pennsylvania District in the 61st, and 63rd Congress, 1909-1915. Appointed judge of the Court of Claims in 1915 he resigned September 1, 1915. Alien Property Custodian, 'Trading with the Enemy' Act, October 22, 1917, to March, 1919. Attorney-General in Wilson's cabinet 1919-1921. Delegate-at-large Democratic National Convention 1912, Member of Executive Committee National Democratic Committee 1912-1920. Received 267 votes for presidential nomination at the Democratic National Convention. San Francisco, 1920, Member of the Society of Friends. (Quakers),

PALMER, ALICE FREEMAN (1855-1902), an American educator, *b.* in Colesville N. Y. She graduated from the University of Michigan in 1876, was for two years principal of the high school, in Saginaw, Mich., then became professor of history at Wellesley College, of which institution she was president during 1882-7. Her ability won for that college a high place among American educational institutions.

PALMER, ANDREW HENRY (1886), Meteorologist, Climatologist. *B.* in Dubuque, Iowa. In 1908 graduated from University of Minnesota. 1908-1912 at Blue Hill Meteorological Observatory of Harvard College as research assistant. In 1912 instructor of geography at Massachusetts State Normal School and at Carnegie Institute in 1913. At the United States Weather Bureau, San Francisco, as assistant observer, 1914-1915, observer 1915-1918, and since 1918 meteorologist. Co-Author (with the late A. Lawrence Rotch) *Charts of the Atmosphere for Aeronauts and Aviators*, 1911; Editor of notes on Meteorology and Climatology in a scientific magazine 1910-1912.

PALMER, CHASE (1856), Chemist, *b.* at Saco, Maine. Graduated from Johns Hopkins College in 1879. Instructed at various schools from 1882-1888. In 1885-1888 state assayer of Massachuetts. 1888-1890 professor of chemistry at Wabash College and in 1890-1894 a manager of lead and zinc mines at Joplin, Missouri. 1895-1906 professor of chemistry at Du Pont Manual Training High School, Central University and Kentucky State College. With the United States Geological Survey in 1906-1907 as special chemist for water and chemist from 1907-1919. Consulting Chemist, Eaton Laboratories.

PALMER, CLAUDE IRWIN (1871), an American college professor, *b.* in Barry co., Mich., s. of Clark Hubbard and Martha Thompson Kellog Palmer. He was educated at the University of Michigan and at the University of Chicago. After being a teacher in district and high schools in Michigan for 8 years he became a member of the faculty of Armour Inst. Tech., Chicago in 1903 and later was made associate professor of mathematics there. Author: *Plane Geometry*, 1915; *Solid Geometry*, 1918; *Analytic Geometry*, 1921 and other books on mathematical subjects.

PALMER, EDWARD HENRY (1840-82), Brit. archaeologist; devoted himself to Oriental studies, became Lord Almoner's prof. of Arabic at Cambridge; perished in an expedition connected with Arabi's Egyptian rebellion; wrote chiefly on Oriental subjects.

PALMER, FREDERICK (1873), an American author and newspaper correspondent, *b.* in Pleasantville Pa. After graduating from Allegheny College, in 1893, he took up journalism and two years later went to London as correspondent for American newspapers. In this capacity he saw fighting in the Turkish-Greek War of 1897, at the bombardment of Manila, in 1898, the Boxer uprising, in 1900, the Macedonian Revolution, in 1903, the two Balkan Wars, of 1912-3, and for the first two years of the World War was with the British Army and Fleet, after which he served in the American Red Cross. He was head of the Censorship with the American Armies in France, with the Rank of Major. He wrote many books, among them being *Going to War in Greece*, 1897; *With Kuroki in Manchura*, 1904; *Central America and its Problems*, 1910; *America in France*, 1918 and *The Folly of Nations*, 1921.

PALMER, GEORGE HERBERT (1842), an American writer and university president, *b.* in Boston, Mass. He graduated from Harvard University, in 1864, then continued his studies abroad, also graduating from the Andover Theological Seminary, in 1870. He was tutor in Greek, 1870-2, curator of the Gray collection of engravings 1872-6, instructor in philosophy, later professor of philosophy and civil polity, at Harvard University, being professor emeritus since 1913. Among his works are an English translation of the Odyssey, in rhythmic prose, 1884; *The Glory of the Imperfect*, 1988; *The Problem of Freedom*, 1911; *Trades and Professions* 1915 and *Altruism, its Nature and Varieties*, 1919.

PALMER, IRVING ALLSTON (1866), an American metallurgist, *b.* at New Waverly, Ind., s. of Lawson and Margaret Stottlemeyer Palmer. He was

educated at Lafayette College. He was successively assayer, chemist, asst. supt. and supt. of the American Smelting and Refining Co., from 1898-1911, and asst. supt. and then supt. of the United Zinc and Chemical Co., Springfield, Ill., from 1911-12, after which he was consulting metallurgist of the U. S. Smelting Refining and Mining Co. until 1916 and became professor of metallurgy of the Colorado School of Mines in 1917.

PALMER, JOHN M AULEY (1817-1900), an American soldier and U. S. Senator, *b.* in Eagle Creek, Ky. He studied law in Illinois, began to practice in 1839, was at first active in Democratic party politics, but on the issue of slavery turned Republican. He entered the Federal Army during the Civil War, rose to the rank of brigadier-general within two years and lead a division at the battles of Murfreesboro and Chickamauga, and during the Atlanta Campaign. In 1869 he was elected Governor of Illinois. In 1890 he was elected to the U. S. Senate on a Democratic ticket, where he served six years. The Gold Democrats nominated him for the Presidency in the campaign of 1896.

PALMER, PAULINE. Artist. *B.* at McHenry, Ill. Studied at the Art Institute, Chicago and in Paris. For a number of years exhibited at the Paris Salon and also at the Naples exposition. Represented in various pemanent collections. Awarded the bronze medal at the St. Louis Exposition in 1904 Young Fortnightly prize, Art Institute, Chicago 1907, bronze medal, Academie de la Grand Chaumiere, Paris. Clyde Carr prize, 1917; Edward Butler Purchase prize 1920 for painting 'In the Open' 1920, silver medal, Chicago Society of Artists; Silver medal Peoria Society of Allied Arts, Peoria, for painting 'The Blizzard', 1921. Has painted portraits of many famous persons.

PALMER, RAY (1808-87), Amer. Congregationalist minister and hymnologist.

PALMER, TRUMAN GARRETT (1858), Statistician. *B.* at West Walworth, Wayne co., New York, Educated in public and high schools of Rochester, New York, Manager in the west of a number of eastern papers. Interested in California land and studied agricultural economics and raising of sugar beets. Executive secretary of American Beet Sugar Association and United States Sugar Manufacturers Association. Author of *Sugar at a Glance, Beet Sugar Industry of the United States. Concerning Sugar, Sugar Beet Seed, Production of Sugar from Beet Roots.*

PALMER, WALTER LAUNT (1854), an American artist, *b.* at Albany, N. Y., *s.* of Erastus Dow and Mary Seaman Palmer. He studied art with F. E. Church, Hudson, N. Y., and later in Paris under Carolus Duran. He made a specialty of painting winter scenes and won many medals, prizes and awards for his work, some of which were: 2d Hallgarten prize, National Academy of Design, 1887; gold medal, Art Club, Phila., 1894; 1st prize, Boston Art Club, 1895; silver medal for water colors, Buffalo Exposition, 1901 and Charleston Exposition, 1902; silver medal for water color and bronze for oil, St. Louis Exposition, 1904; bronze medal, Buenos Aires, 1910; Butler Prize, Chicago, 1919 and others.

PALMERSTON (12° 28′ S., 130° 51′ E.), town, capital, Northern Territory of S. Austrlia, on Port Darwin.

PALMERSTON, HENRY JOHN TEMPLE VISCOUNT (1784-1865), Brit. statesman; Sec. of War in Tory Government of Duke of Portland, 1809, and retained this office till Huskisson's resignation, 1828. He became Minister of Foreign Affairs under Whig Government of Earl Grey, 1830 and made alliance with new constitutional ruler of France, Louis-Philippe, thus ending long enmity of England and France; actively assisted in establishing Belgian kingdom and supported popular claimants, Donna Maria in Portugal and Isabella in Spain.

These measures met with strong opposition at home, especially after disasters in Afghanistan, 1841; fall of ministry, 1841; again Foreign Minister under Lord John Russell, 1846-51. P. was dismissed by queen, 1851, for unauthorised action with regard to France; Home Sec. in Aberdeen administration, 1852; Premier, 1855-58, 1859-65.

PALMETTO LEAVES, the leaves of *Sabal Palmetta,* a fan palm, native of Central America, which are used in making hats and mats.

PALMISTRY, the pseudo-science of pretending to tell a person's character or fortune by the study of the lines and formation of the palm of the hand. It has been practised all over the world and from very ancient times.

PALMITIC ACID. $C_{16}H_{32}O_2$. One of the so-called 'fatty acids', occurring in large quantities in animal and vegetable fats, oils and waxes. It is a colorless waxy substance, melting at 65° C insoluble in water, but soluble in alcohol ether, carbon tetrachloride and other organic solvents. It is prepared by

treating fats with caustic alkalies, thereby producing soaps, and then acidifying. It usually occurs with stearic acid, and a mixture of the two is prepared on a large scale for the manufacture of candles. Palmitic and stearic acids may be separated from fat with the aid of superheated steam.

PALMYRA, celebrated ancient city in Syria, once important centre of caravan trade owing to central position in oasis in Syrian Desert. Mark Antony attempted (*c.* 42 B.C.) to plunder city, but inhabitants fled with their property; under first Rom. emperors P. was independent, with large trade and considerable importance as commercial and religious centre; during Parthian War in III. cent. rose to great power; under Odenathus and then Zenobia P. extended its sway far and wide, till captured by Romans and Zenobia taken prisoner (*c.* 270).

PALNI HILLS (10° 27′ N., 77° 33′ E.), mountain range, Madura, Madras, India; highest summits, 7,000 ft.

PALO ALTO, a plain in Southern Texas, 8 miles from Brownsville, the scene of the first battle of the Mexican War, which was fought on May 8 1846. The American army under Zachary Taylor defeated the Mexicans under General Arista.

PALO ALTO, a city of California. Pop. 1920, 5,900.

PALOS DE LA FRONTERA, a tn. in the prov. of Huelva, Spain. It was from this place that Columbus, in 1492, set sail on his voyage of discovery to America. Pop. 1600.

PALPITATION. See HEART.

PALSITS, VICTOR HUGO (1867), an American historian, *b.* at New York, *s.* of William Thomas and Sidonia Ida Loose Palsits. He was educated at Cooper Inst, and at Columbia U, In 1888 he became connected with the Lenox Library which later became a part of the New York Public Library and of which he was chief of the Div. of American History after 1916. He was the author of numerous books.

PALSY, See PARALYSIS.

PALWAL (29° 9′ N. 77° 22′ E.), town, Gurgaon, Punjab, Brit. India. Pop. 13,500.

PAMIERS (43° 6′ N., 1° 36′ E.), city, Ariege, France, on Ariege, cathedral; ironworks. Pop. 10,600.

PAMIRS, lofty plateau region in CentralAsia, where Hindu Kush, Himalayas, Kuen Lun, and Tian Shan Mts. converge; average height, *c.* 13,000 ft. Mountain ranges are separated by broad valleys or *pamirs*, chief of which are Great Pamir, containing Lake Victoria; Little Pamir; Pamir-i-Wakhan; Sarez Pamir, with river Murghab; Rang Kul, Kara Kul, and Taghdumbash Pamirs.

PAMLICO SOUND, a salt-water lagoon in the E. of N. Carolina, U. S. A. communicating with the Atlantic by Hatteras and Ocracoke inlets.

PAMPA (36° 30′ S. 65° W.), territory, Argentina, S. America, W. of Buenos Ayres; largely covered with grass; cattle-ranches.

PAMPAS (*c*, 26° S., 61° 30′ W.), vast plain in Argentina, stretching from Andes to Atlantic and from Gran Chaco to Rio Colorado; consists mainly of level expanse covered with shingle; in some parts solitary trees to be found; contains several salt lakes; in N.E. is more fertile district, covered with pampas grass, where horses, cattle, and sheep are reared.

PAMPAS GRASS, (*Cortaderia*), a genus of beautiful and almost hardy American grasses. *C. argentea* is the best known species in gardens, and on light, deeply worked soils and in sheltered positions it will survive several degrees of frost. The large, upright, plume like white or silvery panicles of flowers appear in September and October. *C. jubata*, a less hardy species, bears taller rose-coloured panicles.

PAMPERO, a violent wind which sweeps over the Pampas of South America. Its direction is usually West or Southwest.

PAMPHLETS, small paper-covered booklets issued for controversial purposes, generally on a literary, political, or theological topic. The more notable p's: Sexby's *Killing no Murder*, Knox's *Blast against the Monstrous Regiment of Women*, Milton's *Areopagitica*, Defoe's *Shortest Way with Dissenters*, Steele's *Crisis*, Swift's *Drapier's Letters*, Whately's *Historic Doubts*, the anonymous *Letters of Junius*, Burke's *Thoughts on Present Discontent*, and Shelley's *Necessity of Atheism*. These filled the role now played by review articles and letters and leading articles in the public press, and with the advent of a cheap press the p. has fallen into disuse.

PAMPHYLIA, originally a narrow, mountainous region on S. coast of Asia Minor lying along Gulf of Adalia; intersected by several rivers from the Taurus; inhabited by mixed races.

PAMPLONA, PAMPELUNA (42° 50′ N. 1° 12′ W.), town, capital of Navarre,

Spain; strongly fortified; seat of bishopric; has fine Gothic cathedral. Pop. 1919, 29,215.

PAMUNKEY RIVER, a small stream in Virginia, formed by the juncture of the North and South Anna. It then joins the Mattapony at West Point, where it forms the York River. Its total length, including the South Anna, is about 100 miles. The Pamunkey Indian Reservation adjoins its banks. It is notable in history as the scene of military operations during the Civil War between the Union forces under Grant and Sheridan and the Confederates under Lee.

PAN, the great god of flocks and harvest festivals in the myth. of ancient Greece, and particularly associated with Arcadia. In art Pan is represented with horns and goat's feet, and playing on a set of pipes.

PANA, a city of Illinois, in Christian co. Its interests are chiefly connected with coal mines. It has also a creamery Pop. (1920) 6,122.

PANAMA. (1) Republic, Central Ameriea, since 1903; formerly dep. of Colombia. Off the coast lie numerous islands; several large bays—Almirante, Gulf of San Blas, Chiriqui Lagoon, and Gulf of Panama. Traversed by the Sierra de Chiriqui and Cordillera de Veragua. Chief rivers are Bayano, Tuira, and Chagres. Climate is tropical; soil very fertiie, but greater portion unoccupied and only small part of occupied portion is cultivated. Chief industries are cattle raising, agriculture, and pearl fishing. Most important products are bananas, coffee, caoutchouc, cocoa, sugar, and hides. A railway (47 m.) follows course of Panama Canal and connects ports of Colon and Panama; it belongs to U. S., as does the canal zone, which extends 5 m. on either side of canal but does not include cities of Colon and Panama, The republic is divided into seven provinces; the district surrounding gulf of same name is known as Darien; the chief ports are Panama (cap.), Puerto Mudis, Pedregal, Dulce, Montijo, Colon, Bocas del Toro and Puerto Bello. Extreme length, 480 m.; breadth, between 37 and 110 m.; area, 32,380 m.; pop. 336,700. (2) Cap of above republic (9° N., 79° 33′ W.), on Panama Gulf, at Pacific terminus of Panama Canal; has fine cathedral. City (founded 1519) and harbor are under jurisdiction of U.S. in all that relates to sanitation and quarantine. Pop. 61,400.

PANAMA-CALIFORNIA EXPOSITION. See EXPOSITIONS.

PANAMA CANAL, a waterway through the Isthmus of Panama joining the Atlantic and Pacific Oceans. A French company, organized in 1879 by the French engineer, Count Ferdinand de Lesseps, attempted to construct a sea-level canal here but the effort ended in bankruptcy, disgrace for De Lesseps, and a reorganization which promised little hope of success. It caused a sentiment to develop in the United States, however, that such a canal, if dug, should be owned and controlled by the United States. A commission appointed to investigate the matter reported, in 1901, n favor of a canal route through Nicaragua which, though longer, would be facilitated by a series of lakes. Whereupon the French company owning the Panama concession, offered to sell its rights for $40,000,000, this offer being accepted, in 1902. In the following year Columbia refused to confirm the treaty covering the concession, whereupon the Province of Panama revolted and established an independent government, which was recognized by President Roosevelt almost immediately. The treaty for the concession was then concluded with the Republic of Panama, its chief provision being a payment of $10,000,000 on ratification of the treaty and $250,000 yearly thereafter. Work was begun in May, 1904, under the direction of a commission headed by George W. Goethals and on January 7, 1914, a self-propelled crane boat, the La Valley, passed through the Canal from end to end. The Canal was formally thrown open to traffic on August 15, 1914, the steamer Ancon being the first to make the passage, which she did in nine hours and 40 minutes. The waterway, from deep water to deep water, is fifty miles in length, and forty miles from shore line to shore line, the width of the canal being from 300 to 1,000 feet. It has twelve pairs of locks, each 1,000 feet in length. In 1922, which was a record year for the Canal in traffic, 12,992,573 tons of cargo passed through it. American shipping passing through the canal held first place, with a tonnage of 3,993,663. Next place was held by British ships with a total of 3,080,178 tons, Japan taking third place with 777,-172 tons. The number of commercial ships passing through during the year amounted to 2,997, an average of 232 a month, nearly eight a day. The tolls for the year aggregated $12,573,407.

PANAMA-PACIFIC EXPOSITION, See EXPOSITIONS.

PAN-AMERICAN CONFERENCES. Representatives of American republics have frequently met in conferences almost from the date of their establishment beginning with the consideration of projects of confederation, and extending

to proposals for united action, closer commercial relations, consular and postal facilities, measures for promoting Latin-American peace and prosperity, a customs union, better water communication, uniform weights and measures, a uniform silver coin and especially for devising plans for arbitrating differences between the republics. Conferences were held in 1826, 1847, 1856, 1864, 1878, 1882, 1888, 1889, 1890, 1901, 1906, 1910, 1914, 1915, 1921 and 1923. Most of these gatherings were barren of results. The 1906 conference (held at Rio de Janeiro) adopted the Drago doctrine by which it was sought to prevent foreign governments from collecting debts contracted by private firms or corporations of different nations. Later conferences made agreements regarding literary and artistic property and commercial and trade marks, extended the existence and powers of the committee in charge of plans for a Pan-American railroad, provided for better steamship communication between the republics, for uniform customs documents, uniformity of census dates, and recommended uniformity of consular documents.

The conference of 1923 met at Santiago, Chile, in March, and was viewed as the most significant of such periodic assemblages. Henry P. Fletcher, American Ambassador to Belgium, represented the United States. The agenda provided for discussion of and action on limitation of armaments; arbitration for political and commercial disputes; questions arising from encroachments on rights of American nations by foreign powers in disregard of the Monroe Doctrine; closer association of American republics (an ancient subject of conference); prohibition; land, sea, and air communication, and other matters. Little was done to carry out this auspicious programme. The conference lasted six weeks. The major projects on the agenda were not endorsed, but were disposed of, according to custom, to committees for further consideration in the future.

The leading countries, Argentina, Brazil, and Chile could not compose their deep-rooted differences as to limiting their armaments. The South American countries, especially Uruguay, wanted a Pan-American League of Nations, independent of the European League, but the American delegation objected to its consideration. The South American republics also sought through Brazil for a revised definition of the Monroe doctrine so that it could be a Pan-American and reciprocal agreement, whereby any foreign encroachment or attack on any one nation on the American continent should be construed as an attack upon all. This proposal meant making the application of the Monroe Doctrine a matter of inter-American concern rather than one exclusively for the United States to support, the implication being that Latin-America had become capable of defending herself against foreign aggression without the moral or physical aid of the United States. Ambassador Fletcher, however, barred consideration of the proposal by declaring that the Monroe Doctrine was not a regional understanding (and apparently could not be with American consent) but was the unilateral (*i.e.*, one-sided) national policy of the United States. The conference also sought an expression of the American policy in the Caribbean and Central America, especially regarding American military and political control of certain republics. This, too, was a barred subject. A proposal for the establishment of an American international court of justice on the lines of the tribunal created by the Central American Conference (*q.v.*), was postponed by another meeting to be held at Rio de Janeiro in 1925. The failure to agree on limiting naval armaments was attributed to the difficulty Brazil encountered in consenting to the *status quo* as a basis of limitation, as her navy was not in an efficient condition, and Argentina's feeling regarding Brazilian plans for augmenting her navy by American contracts.

The conference adopted a treaty for investigating disputes that might lead to war, also an agreement for the protection of trade marks, and revived an old project for the codification of American international law.

PAN-AMERICAN EXPOSITION. See EXPOSITIONS.

PAN-AMERICAN UNION, an organization of the twenty-one American republics, first formed in 1890 as the International Bureau of American Republics, and re-named as above in 1910. Its aim is to promote, develop and consolidate amity and peace among the republics and encourage inter-American commerce. The countries composing the Union are the United States, Argentina, Bolivia, Brazil, Chili, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Salvador, Uruguay and Venezuela. These countries support the Union by contributing quotas based on population. It holds frequent conferences on the state of Pan-Americanism. It has a director-general (in 1923 Dr. L. S. Rose) and a governing board composed of the U. S. Secretary of State and the diplomatic representatives in Washington of

the other republics. Its seat is a handsome building in Washington erected by the munificence of Andrew Carnegie and contributions from the associated republics. This building, with its noteworthy library its corps of commercial specialists translators, editors statisticians and librarians, and the monthly periodical issued from it in English, Spanish and Portuguese, serves as a clearing house for all matters bearing upon Pan-American political, commercial and social progress. See PAN-AMERICAN CONFERENCES.

PANATHENÆA, a great festival of ancient Athens in honor of the patron deity, Athena. The robe of Athena was carried in a procession and placed on Athena's statue in the citadel. Important contests in the arts were held during the festival.

PANCH MAHALS (22° 50′ N., 73° 50′ E.), district, Gujarat, Bombay, India; chief town, Godhra. Pop. 265,000.

PANCOAST, HENRY SPACKMAN (1858), Author, *B.* at Germantown, Pa. Educated by private tutors and graduated from Trinity College in 1912. In 1882 admitted to bar, but retired in 1887 to teach literature. Author of: *Representative English Literature,* 1892; *Introduction to English Literature* 1895; *4th edition* 1917; *Study Lists, Chronological Tables and Maps,* 1908; *Introduction to American Literature,* 1898, revised edition, 1911; *A First Book of English Literature* (with P. V. D. Shelley), 1911; *Frank Norris, introduction to McTeague in The Modern Library,* 1918. Editor: *Standard English Poems,* 1900; *Standard English Prose, Bacon to Stevenson* 1902; *Early English Poems* (with J. D. E. Spaeth), 1911; *A Vista of English Verse,* 1911; *English Prose and Verse from Beowulf to Stevenson,* 1915.

PANCREAS, a gland present in vertebrates (with exception of some divisions of fishes) originating from a diverticulum of the gut near the beginning of the mid-gut or the stomach. It secretes ferments, such as trypsin, which aid the process of digestion by changing proteids and peptones into amino-acids, starch into sugar, and fats into fatty acids and glycerine. The p. of cattle or sheep used as food is known as *sweetbread.*

PANDERMA (40° 18′ N., 27° 57′ E.) town, ancient *Panormus,* Asia Minor, on Sea of Marmora.

PANDHARPUUR (17° 39′N., 75° 21′ E.), town, Sholapur, Bombay, India, on Bhima; place of pilgrimage. Pop. 34,000.

PANDORA (classical myth.), first woman; created to place discord in men's hearts by her beauty. P.'s casket, opened by Epimetheus, contained all human ills, or, according to different legend, blessings on mankind.

PANDULF (*d.* 1226), papal legate sent to Eng. king, John; bp. of Norwich later.

PANDURA, TANBUR, MANDORÉ, BANDORÉ, an ancient stringed instrument of the lute kind, with vaulted back, long neck, and two, three four or six strings plucked by the fingers; oval-shaped p. used by Egyptians and, later, by Spaniards; pear-shaped p. used by Persians and Assyrians.

PANENTHEISM, name applied by Krause to his attempted reconciliation of theism and pantheism; God is not in the world, nor outside it, but the world is in Him, and He extends beyond it.

PANGBORN, GEORGIA WOOD (1872) an American authoress, *b.* at Malone, N. Y., *d.* of George H. and Mary Prentice Wood. She was educated at Franklin (N.Y.) Academy and at Packer Institute. She married H. L. Pangborn of New York in 1894. In addition to contributing to Scribner's, Harper's, Collier's Weekly and other magazines she was the author of: *Roman Biznet,* 1902 and *Interventions,* 1911.

PANGENESIS, theory of Darwin that the egg or bud, the agent in reproduction, contains granules (*gemmules*) from cells in all parts of the parent body; the gemmules give rise to cells similar to those by which they were thrown off. See HEREDITY.

PANGOLIN. An edentate mammal found in Africa and the rocky districts of India and China, otherwise known as the Manis or Scaly Anteater. It varies in length from two-and-a-half to six feet, the larger specimens occurring in Africa. Its body is covered with horny scales, and in the Asiatic species hair grows between them. It has the power of rolling itself into a ball, like the hedgehog, when it is completely protected by its scales. It dwells in burrows which it rarely leaves in the daytime, and feeds upon ants and termites which it catches with its long, flexible sticky tongue.

PANIN, NIKITA IVANOVICH, COUNT (1718-83), Russ. statesman; chief minister during regency of Catherine II. after revolution of 1792; initiated idea of alliance of northern powers, including Britain, against France, Spain, and Austria; failure of this policy led to his fall, 1781; *b.* Peter, 1721-89 was dis-

tinguished general; Nikita's s., Victor, was also a statesman.

PANIPAT (29° 23′ N., 77° 1′ E.) town, Punjab, Brit. India; scene of defeat of Mahrattas by Afghans 1761. Pop. 28,000.

PANIZZI, SIR ANTHONY (1797-1879), Eng. librarian of Ital. stock; studied at Padua, but, being implicated in revolution of 1821, fled to Liverpool. In 1828 he became prof. of Italian at Univ. College, London; assistant librarian at Brit. Museum, 1821, and from 1856 to 1866 librarian-in-chief; always took a keen interest in cause of Ital. freedom.

PANJDEH, PENJDEH (36° N., 62° 40′ E.), village, fort, Russ. Turkestan, on Murghab.

PANNA, PUNNA (24° 44′ N., 80° 14′ E.), native state, Bundelkhand, Central India. Pop. 195,000. Chief town, Panna. Pop. 12,300.

PANNONIA, ancient country, part of Rom. Empire, lying S. and W. of Danube in Austria-Hungary; probably originally inhabited by brave but treacherous Illyrian race; country fairly productive and originally well wooded; chief rivers, Drave and Save.

PANŒTIUS (II. cent. B.C.) Stoic philosopher; *b.* Rhodes; succ. Antipater as head of Stoic school at Athens.

PANORAMA, all that the eye can see at one time; also used of photographs and models giving extensive views of towns, etc.

PANPSYCHISM, theory that not only human beings have a psychical life but that all through nature atoms and molecules exhibit a rudimentary life of sensation, feeling, impulse.

PANORMUS, Lat. name for Palermo.

PANSLAVISM, movement towards unity of Slav peoples; took definite shape *c.* 1825; congresses at Prague, 1848 and Moscow, 1867. The Russo-Turkish War was declared, *inter alia,* to free oppressed Slavs, 1877; plays great part in Austro-Hungarian politics, and on death of present emperor will become still more important. Russ. Panslavists desired to unite all Slav peoples under rule of tsar. The Balkan Alliance of 1912 was the most significant Panslavistic confederacy.

PANSY, HEARTSEASE (*Viola tricolor*) a herbaceous dicotyledon; many varieties are garden favorites; flower is pentamerous and has velvety texture.

PANTELLERIA, PANTALARIA (36° 48′ N., 12° E.), island to S.W. of Sicily, Mediterranean; produces olives, cereals, exports wine. Pop. 9,100. Cheif town, Oppidola.

PANTHEISM, the philsophical and religious conception which makes God and the Universe the same thing. It is found in Hindu, Gk., mediaeval, and modern philosophy; one of its greatest exponents was the Jewish philosopher, Spinoza; but worship of a God who is 'imprisoned in His universe' fails to satisfy the religious needs of many.

PANTHEON—(1) Rom. temple built to Mars and Venus by Agrippa, 27 B.C.; rebuilt in Hadrian's reign; now S. Maria Rotunda. (2) building in Paris, originally Church of Sainte Geneviéve, 1746; now dedicted *Aux grandes hommes la Patrie reconnaissante,* burial-place of celebrities.

PANTHER. See under CAT FAMILY.

PANTIN (48° 53′ N., 2° 23′ E.), town, Seine, France; railway wagons, chemicals. Pop. 36,000.

PANTOGRAPH, instrument for copying maps, plans, sketches, etc., on the same or a different scale; consists of long wooden or metal arms so arranged that while the artist traces over the original figure with one, a pencil placed in another makes an enlarged, reduced, or exact copy as desired.

PANTOMIME (Lat. *pantomimus,* spectacular performance with incidental music), in modern times signifies a play dependent more on pageantry, gesticulation, and burlesque than on strength of plot or excellence of acting; developed from rustic ballets and folklore plays; greatly developed in Italy; imported into France, where it became extremely popular though more sophisticated. In Germany the rough *Hanswurst* died about 1740; its descendant is the *Zauberposse.*

In England the masque preceded the p., which began to develop independently on the decay of the former about 1700, and grew to be a regular Christmas entertainment, and the 'Harlequin,' 'Columbine,' and 'Pantaloon' were familiar figures till the later half of the XIX. cent. The earlier p's were characterised by the alternation of serious and comic interludes, as in *Perseus* and *Andromeda* (early XVIII. cent.).

PANTON (42° 30′ N., 7° 40′ W.), town, Lugo, Spain. Pop. 13,500.

PAOLI, PASQUALE (1725-1807), Corsican soldier; almost won independence for Corsica; fled to England, where he received a pension; raised another unsuccessful insurrection, 1795.

PAPA, a town in the prov. of Veszprim, Hungary, 75 miles W. of Budapest. Principal pursuits are vine-growing and weaving. Pop. 20,000.

PAPACY, The papacy is the highest office in the R.C. Church, and its occupant is called the Pope. According to the teaching of the R.C. Church, the office of the papacy is of divine origin, having been established by Christ before His ascension into heaven. On this theory of Church constitution it is the office Christ Himself would hold had He elected to continue on earth His public ministry; and consequently the Pope is believed to hold Christ's place on earth, to be His representative and the visible head of His Church. He is styled by his Church 'the Vicar of Christ' and 'Successor of St. Peter,' who was the first to hold the office of Pope. In the constitution of this Church the Pope fulfils a threefold function—viz., he is Bishop of Rome, patriarch of the West, and head of the whole Church. As Bishop of Rome his rule will be more detailed and more immediate in the diocese of Rome than in any other diocese. As Patriarch of the West his personal authority in the West will be fuller and more immediate than in the East. But as Pope he claims to rule the universal Church equally.

Tht theory of this Church is that of a visible as distinct from an invisible society, and on that teaching the papacy is the principle of eccles. unity. All those in union with the Pope are regarded as members of the 'body of the faithful,' those not holding such communion with him being regarded as 'outside the Church.' He is the supreme legislator for the whole Church, and holds eccles. jurisdiction, immediate and personal, over every member individually, this position being held not to be inconsistent with the jurisdiction of a similar character enjoyed by bishops, each within the limits of his own diocese. He holds the plenitude of jurisdiction for all external government—legislative, executive, and judicial—his action being limited only by such provisions in the eccles. constitution as are taught to have been made by Christ.

Besides this jurisdiction in external matters, his Church claims for the occupant of the papacy jurisdiction in matter of conscience and the law of God—not to dispense from or alter the natural or divine positive law, but to forgive sins committed against God, if those sins are duly repented of and confessed. The plenitude of this jurisdiction resides in the papacy, and is derived therefrom directly or indirectly by all 'confessors' or priests holding faculties to hear confessions. This jurisdiction is known to Catholic writers as 'the power of the keys.'

It is also taught by the R. C. Church that in the papacy resides the prerogative of personal infallibility. By this prerogative the Pope is not declared to be inspired by God, nor does the claim extend to secular matters of any kind. It is also contended that no new doctrine is promulgated, but that when the Pope teaches, not in his private capacity, but *ex cathedra*, as it is technically termed—*i.e.*, when in the fullness of his apostolic authority, as father and teacher of the faithful, he proclaims a doctrine of faith or morals to be held by the universal Church—he is so guided by the Holy Ghost in his deliberations and judgments that his pronouncement is infallibly true and 'irreformable.' It is maintained that the whole deposit of Christian revelation is confided to him, and that in officially declaring a doctrine of revelation to be held by all he cannot err. This note of infallibility is not considered to attach to any disciplinary measure, to eccles. laws, or to political or social utterances, as such, even when issued formally and officially in the plenitude of 'apostolic authority.' These must stand upon their own merits and the principles of authority and submission that underlie them, infallibility being restricted to a declaration that a certain point of faith or morals has been revealed or not revealed by God. Moreover, infallibility in teaching is not held to include impeccability in conduct. The Pope is held to be liable to the human frailty incident to a fallen race, to be exposed to sin like any of his subjects, and to stand in need of the same circumspection and means of grace as other men.

The third outstanding prerogative claimed for the papacy by its adherents is immunity from the control of all civil power. The spiritual sphere being held to be suptrior to the civil sphere, it is maintained by those who support the papacy as here understood that the occupant of the papal throne should be absolutely free from all secular control, that the Vicar of Christ' on earth should not be the subject of a temporal ruler, that this civic independence is necessary for the proper discharge of those duties belonging to the papacy, allegiance being owned to the spiritual power of Rome by millions of the subjects of various temporal rulers throughout the world; and that the free intercourse between the head of the Church and his subjects should be hindered if he himself were trammelled by civic subjection.

Tht Pope has been declared to be superior to a general council of bishops and no appeal lies from him to such a

council. This is the principle against which 'Gallicanism' contested, and which was upheld by the 'Ultramontanists.'

The Pope is regarded as the direct successor of St. Peter in the papacy, the bond of succession being the bishopric of Rome; so that the fact of being elected Bishop of Rome constitutes him head of the whole R.C. Church, and inheritor of all the powers and privileges of the papacy. These papal powers and prerogatives are proclaimed not to be devolved ministerially upon the Pope by the Church, but to be conferred directly on the papacy by Christ. It is also the teaching of this Church that the successor of St. Peter in the see of Rome can never fail in faith, and that the faith of that particular see is the criterion of the true faith of Christ. The Pope is elected by the College of Cardinals, seventy in number, composed of the six bishops of the suburban sees of Rome, called cardinal-bishops; the fifty priests of the Roman parishes, called cardinal-priests; and the fourteen deacons of old charitable institutions, known as cardinal-deacons. In order to give a wider representation in the election of a Pope, appointments to these titles are made from amongst ecclesiastics of high standing in different countries, those holding the titles constituting them cardinals being relieved from discharging the duties attached thereto. Any male member of the Catholic communion is constitutionally eligible for the papacy, but is bound on election to take episc. orders if he is not already a bishop. Tht insignia of office are the straight crosier, the pallium, and the papal tiara or triple crown.

The Pope is addressed as 'your Holiness,' and speaks of himself as '*Servus servorum Dei*,' 'the servant of the servants of God'.

History.—Rome as the capital of the Roman Empire was the natural centre of the early Christian organization, and the Bishop of Rome was at the time of the councils of Nicaea, 325, and Antioch 341, recognized as metropolitan. From the removal of the imperial court to Constantinopie Rome stood forth as the champion of orthodoxy, and the papal prerogatives were gradually formulated and recognized. The division of the empire in 395 assisted the firm establishment of the authority of the Bishop of Rome. Leo the Great, 440-61 secured the general recognition of the supremacy of the Bishop of Rome, and asserted the right of bishops to appeal to him.

By the time of Gregory the Great, 590-604 the Church had by bequests acquired a considerable amount of landed property, and its power was much enhanced by its friendship with the Frankish kings. By the close of the 7th cent. the theory of the primacy of the Bishop of Rome was accepted throughout the West, and after 800, while the pope claimed to crown the emperor, the emperors asserted their right to confirm the election of the Pope. During the 11th and early part of the 12th century the popes were controlled by the emperors. Gregory VII. 1073-85, insisted on administrative reforms in the Church, and on a reformation in the morals of the clergy, and attempted to secure the subordination of the State to the Church. This great improvement in the papacy coincided with the foundation of the religious orders, and with the outbreak of the Crusades. By them the prestige of the papacy was enhanced, while the growth of canon law, the victory in the investiture contest, and the influence of Bernard of Clairvaux, the firm advocate of the papal claims, did much to place the papacy in a position of independence. Victories in England over Henry II. and in Italy over Frederick Barbarossa served to prepare the way for Innocent III., whose rule, 1198-1216, marks the culminating point of the papal power. His successors not only held their own against the Emperor Frederick II., but a few years after his death overthrew the Hohenstaufen power. Boniface VIII. 1294-1303, failed to recognize the growth of national feeling, and suffered defeat in attempting to force England and France to obey his mandates. From 1309 to 1377 the popes lived at Avignon, and during this 'Babylonian captivity' lost much of their power.

After the return to Rome the great schism broke out, a rival pope or antipope being installed at Geneva, and it was not till 1414-16 that this was ended and Martin V. placed on the papal throne. As a result of the inability of the popes to reform the Curia, and to amend many doctrines which had crept into recognition, the Reformation movement broke out in 1517.

The break of England and all N. Germany from Rome roused the papacy, and and Paul III. 1534-49, began the task of reforming the Church. He recognized the spiritual needs of the time, and encouraged the reformation of the monastic bodies and the foundation of new orders such as the Capuchins, the Theatines, and the Jesuits, who did so much in the work of revival. By the Tridentine decrees, ratified by Pius IV. on Jan. 26, 1564, the Church of Rome acquired a clearly and sharply defined 'body of doctrine,' and at the same time the descipline of the Church was fully reformed. The Catholic revival in France, which marked the reigns of Louis XIII. and to some extent that of

Louis XIV., coincided with the great attempt made by the Emperor Ferdinand II. during the Thirty Years' War to regain all Germany to Roman Catholicism. Urban VIII. 1623-44, was unable, owing to Richelieu's firmness, to effect a complete Catholic restoration in France, and the peace of Westphalia ended the attempt to impose Catholicism throughout Western and Central Europe.

The 18th cent. was a time of trial for the papacy, owing to the spread of irreligion all over Europe, for which the R.C. Church was itself largely to blame. The enlightened reformers were for the most part opposed to the claims of the papacy, and the general attack on the Jesuits between 1758 and 1770 testified to the determination of most European rulers not to permit any interference by the papacy with their affairs. Joseph II. hoped at one time to found a national Church, and the whole course of the Fr. revolution was disastrous to the cause of Roman Catholicism. Napoleon I. did indeed restore in a very modified sense the papal authority in France; but it was not till after 1815 that a reaction in favor of the Church took place, and the Jesuits, who had been abolished by Clement XIV., were restored. During the pontificate of Pius IX. 1846-78, the papal position was further defined, an an Ultramontane attitude was taken u In 1854 the bull *Ineffabilis Deus* declare the immaculate conception of the Bless Virgin Mary to be a doctrine of th Church. In 1864 the encyclical *Quan Cura*, and the Syllabus, giving a list errors which were to be avoided, arous conciderable attention. The hierarch in England had already been re-estal lished, and a R.C. univ. in Ireland ha been set on foot. In 1870 the pap infallibility was proclaimed; but th same year Victor Emmanuel, by th occupation of Rome, put an end to th temporal power of the popes, who hav since resided in the Vatican.

Leo XIII. 1878-1903, restored th hierarchy in Scotland. He held firml to his own rights, protested again heresy, and declared that in religion wa to be found the onlysolution of socialist problems. He issued the bull *Aposto icoe Curoe*, declaring the invalidity Anglican orders. Leo XIII, was su ceeded by Pius X., who showed his i flexible resolve to maintain the righ and liberties of the Church, as wa evidenced by his attitude towards th Fr. Government's Separation Law 1906. (See MODERNISM.) The presen Pope, Pius XI., was elected in 1922.

Below will be found a complete list of the Popes from S. Peter to Pius XI with the date of their accession. In the case of the first 26 the dates are doubtfu (S. is prefixed to names of those canonised and B. to thosebeatified.)

	A.D.
S. Peter	40
S. Linus	67
S. Anacletus, or Cletus	78
S. Clement I.	90
S. Evaristus	100
S. Alexander I.	107
S. Sixtus I.	116
S. Telesphorus	125
S. Hyginus	136
S. Pius I.	142
S. Anicetus	154
S. Soter	168
S. Eleutherius	177
S. Victor I.	189
S. Zephyrinus	200
S. Calixtus I.	218
S. Urban I.	222
S. Pontianus	230
S. Anterus	235
S. Fabian	236
S. Cornelius	251
S. Lucius I.	253
S. Stephen I.	254
S. Sixtus II.	257
S. Dionysius	259
S. Felix I.	269
S. Eutychian	275
S. Caius	283
S. Marcellinus	296
S. Marcellus I.	304?
S. Eusebius	309
S. Melchiades	311?
S. Sylvester I.	314
S. Marcus	337?
S. Julius I.	341?
S. Liberius	352
S. Damasus I.	366
S. Siricius	384
S. Anastasius I.	399?
S. Innocent I.	402
S. Zosimus	417
S. Boniface I.	418
S. Celestine I	428?
S. Sixtus III.	432
S. Leo I.	440
S. Hilarius	461
S. Simplicius	468
S. Felix III.	483
S. Gelasius I.	492
S. Anastasius II.	496
S. Symmachus	498
S. Hormisdas	514
S. John I.	523
S. Felix IV.	526
Boniface II.	530
John II.	533
S. Agapetus I.	53
S. Silverius	53
Vigilius	53
Pelagius I.	55
John III.	56
Benedict I.	57
Pelagius II.	57
S. Gregory I.	59
Sabinianus	60
Boniface III.	60
S. Boniface IV.	60
Deusdedit I.	61
Boniface V.	61
Honorius I.	62
Severinus	64
John IV.	64
Theodore I.	64
S. Martin I.	64
S. Eugenius I.	65
S. Vitalianus	65
Deusdedit II.	67
Donus I.	67
S. Agatho	67
S. Leo II.	68
S. Benedict II.	68
John V.	68
Conon	68
S. Sergius I.	68

	A.D.
John VI.	701
John VII.	705
Sisinnius.	708
Constantinus.	708
S. Gregory II.	715
S. Gregory III.	731
Zachary.	741
Stephen II.	752
Stephen III.	752
S. Paul I.	757
Constantinus II.	767?
Stephen IV.	768
Adrian I.	771?
S. Leo III.	795
Stephen V.	816
S. Paschal I.	817
Eugenius II.	824
Valentinus.	827
Gregory IV.	827
Sergius II.	844
S. Leo IV.	847
Benedict III.	855
S. Nicholas I.	858
Adrian II.	867
John VIII.	872
Martin II.	882
Adrian III.	884
Stephen VI.	885
Formosus.	891
Boniface VI.	896
Stephen VII.	897?
Romanus.	898?
Theodore II.	898?
John IX.	898
Benedict IV.	900
Leo V.	903
Christopher.	903
Sergius III.	904
Anastasius III.	911
Lando.	913
John X.	915†
Leo VI.	928
Stephen VIII. (or VII.?)	929
John XI.	931
Leo VII. (or VI.)	936
Stephen IX. (or VIII. ?)	939
Marinus II.	943?
Agapetus II.	946
John XII.	956
Leo VIII.	963
Benedict V.	964
John XIII.	965
Benedict VI.	972
Benedict VII.	975?
John XIV.	984?
Boniface VII.	984
John XV. or XVI.	985
Gregory V.	996
Sylvester II.	999
John XVII.	1003
John XVIII.	1003
Sergius IV.	1009
Benedict VIII.	1012
John XIX.	1024
Benedict IX.	1033
Gregory VI.	1045
Clement II.	1046
Damasus II.	1048
S. Leo IX.	1049
Victor II.	1055
Stephen X. (or IX.?)	1057
Nicholas II.	1059
Alexander II.	1061
S. Gregory VII.	1073
Victor III.	1087?
Urban II.	1088
Paschal II.	1099
Gelasius II.	1118
Calixtus II.	1118
Honorius II.	1124
Innocent II.	1130
Celestine II.	1043
Lucius II.	1144
B. Eugenius III.	1145
Anastasius IV.	1153
Adrian IV.	1154
Alexander III.	1159
Lucius III.	1181
Urban III.	1185
Gregory VIII.	1187
Clement III.	1187
Celestine III.	1191
Innocent III.	1198
Honorius III.	1216
Gregory IX.	1227
Celestine IV.	1241
Innocent IV.	1243
Alexander IV.	1254
Urban IV.	1261
Clement IV.	1265
B. Gregory X.	1271
Innocent V.	1276
Adrian V.	1276
John XXI.	1277
Nicholas III.	1277
Martin IV.	1281
Honorius IV.	1285
Nicholas IV.	1288
S. Celestine V.	1294
Boniface VIII.	1294
B. Benedict XI.	1305?
Clement V.	1305
John XXII.	1316
Benedict XII.	1334
Clement VI.	1342
Innocent VI.	1352
B. Urban V.	1362
Gregory XI.	1370
Urban VI.	1378
Boniface IX.	1389
Innocent VII.	1404?
Gregory XII.	1406
Martin V.	1417
Eugenius IV.	1431
Nicholas V.	1447?
Calixtus III.	1455
Pius II.	1458
Paul II.	1464
Sixtus IV.	1471
Innocent VIII.	1484
Alexander VI.	1492
Pius III.	1503
Julius II.	1503
Leo X.	1519?
Adrian VI.	1522
Clement VII.	1523
Paul III.	1534
Julius III.	1550
Marcellus II.	1555
Paul IV.	1555
Pius IV.	1559
S. Pius V.	1566
Gregory XIII.	1572
Sixtus V.	1585
Urban VII.	1590
Gregory XIV.	1590
Innocent IX.	1591
Clement VIII.	1592
Leo XI.	1603
Paul V.	1605
Gregory XV.	1621
Urban VIII.	1623
Innocent X.	1643?
Alexander VII.	1655
Clement IX.	1667
Clement X.	1670
Innocent XI.	1676
Alexander VIII.	1689
Innocent XII.	1691
Clement XI.	1700
Innocent XIII.	1721
Benedict XIII.	1724
Clement XII.	1730
Benedict XIV.	1740
Clement XIII.	1753?
Clement XIV.	1769
Pius VI.	1775
Pius VII.	1800
Leo XII.	1823
Pius VIII.	1829
Gregory XVI.	1831
Pius IX.	1846
Leo XIII.	1878
Pius X.	1903
Benedict XV.	1914
Pius XI.	1922

PAPAL STATES. See STATES OF THE CHURCH.

PAPAVERACEÆ, natural order of plants; flowers, on long stalks, have two sepals and four petals; fruit is a capsule containing many seeds; yields opium (*q.v.*).

PAPAW (*Carica papaya*), S. Amer. tree yielding melon-like fruit, which is used as a vegetable and peptoniser.

PAPE, ERIC (1870), an American painter, *b.* in San Francisco, Cal. After finishing a public school education in his native city he studied art in Paris, under

Boulanger, Lefebvre, Constant, Blanc and at the Ecole des Beaux Arts under Gerome and Laurens. After a period of travel he became instructor in the Cowles Art School, in Boston, then, in 1898, founded the Eric Pape School of Art, of which he was head instructor till 1913. He has also done a great deal of illustrating.

PAPEETE, PAPEITI (17° 32′ S., 149° 34′ W.), seaport, Tahiti; capital of Society Islands. Pop. 3,700.

PAPEN, FRANZ VON, Ger. diplomatist; was military attache at Ger. embassy in Washington, 1914; from commencement of World War continually violated neutrality and hospitality o) U. S., was connected with bomb plots, passport frauds, etc., and endeavored to dislocate work in factories suspected by him of making munitions for Allies. Evidence against him accumulated in hands of Amer. Government, and his complicity in criminal offences revealed at trial of Hamburg-America line officials in New York (Nov. 1915) resulted in his expulsion.

PAPER. The art of paper making has been known for more than 1800 years and originated in China. In ancient Egypt, papyrus made from a water plant was used much as paper is used to-day, but this was not true paper, which consists of a sheet of felted fibres artificially prepared from some vegetable material, and dried. Paper is believed to have been invented by the Chinese statesman T'sai Lun, who made paper from bark, hemp, rags and old fish nets in 105 A.D. From the Egyptians, the Arabs learned the art in 704 A.D. and an Arabian document written on paper in 866 A.D. is still in existence. Paper was first made in Europe in 1154, and in England in the early years of the sixteenth century. The first paper mill in the United States was the Rittenhouse Mill, started by William Bradford, at Germantown, Pa., in 1690. At the present day there are over 800 pulp and paper mills in the United States, the annual production being between five-and-a-half and six million tons of paper and boards. Paper has been classified according to the following grades.

Newsprints made from ground and chemical wood pulp. Daily production (U.S.A.) about 4,500 tons.

Books and Magazines, including circulars, bulletins, catalogs and general printing papers, made from chemical pulp with some rag and ground wood. Daily production 2,800 tons.

Boards, made from a variety of raw materials, according to quality. Daily production 6,500 tons.

Wrappings, made from chemical pulp, ground wood and waste-paper. Daily production 2,400 tons.

Writing paper, made from rags and chemical pulp. Daily production 1,360 tons.

Tissue, including cigarette paper, made from chemical pulp, flax, hemp and ramie. Daily production 440 tons.

Building Papers and *Felts*, made from low grade rags, old gunny sacks, waste papers and other cheap materials. Daily production 850 tons.

Miscellaneous, including blotting paper, drawing paper, filter paper, parchment paper and others, made from various raw materials. Daily production 600 tons.

The first step in the manufacture of paper is the preparation of pulp. In former times, practically all paper was made from rags, bnt to-day rags form less than one per cent of the total raw material used. Nearly all paper commonly used, except high-grade writing, is made from wood, and the pulp is prepared either by grinding the wood or by boiling it with chemicals under pressure. There are three different methods of manufacturing chemical pulp, known respectively as the 'soda,' the 'sulphite,' and the 'sulphate' process. In all three processes, the wood is first cut into small chips. In the soda process it is boiled with caustic soda, in the sulphite process with calcium and magnesium bisulphite and in the sulphate process with a mixture of caustic soda, and sulphate sulphide and carbonate of sodium. The purpose of all these processes is to dissolve out the intercellular matter in the wood, leaving the cells, or fibres of nearly pure cellulose. These fibres form the pulp. After cooking, the liquor is drained off, the pulp is washed and bleached, and then beaten. The purpose of the beating is to separate the fibres and get the pulp into the right condition for feeding to the paper machines. During the beating fillers, loading materials, coloring matter and size are added. The commonest filler is clay, although talc and calcium sulphate are sometimes used. The size usually consists of rosin soap. After beating and sizing, the pulp, in the form of a thin 'soup', is fed on to the wet end of the paper machine. This consists of an endless belt of wire cloth, running over rolls. The belt receives a continuous shaking motion in a direction at right angles to that in which it is travelling. This causes the fibres to 'felt', or interweave, which gives strength to the finished sheed. As the pulp passes over the screen, the water drains away and a wet sheet is produced which is fed between rollers, where still more water is squeezed out. The sheet then passes on

to large hollow, steam heated drums, where is is finally dried. It may then be 'calendered' by passing between a number of highly polished cast-iron rolls.

Paper from ground wood is made by a similar process, but the pulp is prepared by pressing the wood against revolving grindstones kept cool by a stream of water. *Rags* used for paper making must first be sorted to separate wool from linen and cotton (the two latter alone being used) and colored rags from white. They are then run through machines which beat out the dust and cut them up, Next they are boiled in a solution of caustic or carbonate of soda, or with lime, then washed, beaten and bleached. This treatment reduces the rags to a pulp, similar to the pulp prepared from wood, but having longer fibres. The resulting paper is therefore stronger than that made from wood-pulp.

PAPER MONEY. See COINAGE; CURRENCY; MONEY.

PAPER NAUTILUS, or PAPER SAILOR (*Argonauta*), a genus of cephalopod molluscs which, in the case of the females, hold the shell to the body by two dilated, specially adapted arms; it is not attached as in other molluscs by a special muscle. The male is much smaller than the female and is shell-less. The female retains her eggs and hatches them in the shell, which may, therefore, be taken to have been elaborated for this purpose. It is indeed the only dibranchiate mollusc which secretes an external calcareous covering. The animal swims by ejecting water from its funnel, not by elevating two of its arms as sails in the manner represented by ancient fable. It can also creep on the sea-bottom.

PAPER TEXTILES AND YARNS. The yarn is made from paper run from reels and split into strips, which are damped and twisted. Clothing material has been made by alternating wool and paper yarns two by two. While such cloth may have been acceptable as a war-time substitute, opinion as to the permanent status of the industry is cautious. As a substitute for jute in twine or carpet matting, there are greater possibilities.

PAPER, WALL. See WALL PAPER.

PAPHLAGONIA, ancient mountainous district on N. side of Asia Minor, along Black Sea; boundaries uncertain; famous for hunting-grounds; known to Greeks in mythical period; *Paphlagon,* according to Argonautic legends, eponymous hero.

PAPHOS, PAPHUS, two towns on W. coast of Cyprus.—(1) Old P., on river Bocanus, was chief seat of worship of Aphrodite. (2) New P., on fertile plain.

PAPIAS, bp. of Hierapolis (*c.* 60-135 A.D.) included in Apostolic Fathers (*q.v.*); wrote *Exposition of the Lord's Oracles,* of which fragments are preserved in Eusebius. The work is valuable, as P. knew St. John and Polycarp.

PAPIER MACHÉ, substance manufactured from useless paper by pulping and drying, or by super-imposing several sheets of paper one on another, and subjecting the whole to pressure; sometimes admixed with earthy substances; used for pilaster work, surface for gilding, and other japanned ornaments, masks, etc. The p. m. work done in Japan is world famous.

PAPILIONACEÆ (Lat. *papilio,* butterfly), division of plants, order Leguminosae; flowers have 5 petals, one of which, the *standard,* is superior; 2 inferior, forming the *keel* or *carina*; 2 lateral, forming *wings* or *aloe*; types are Pea, Bean, Clover, Broom, etc.

PAPIN, DENIS (1647-*c.* 1712), Fr. physicist; *b.* Blois; plysician, then prof. of Mathematics, Marburg; invented' digester,' safety-valve, and discovered principle of siphon; with Boyle experimented on properties of gases.

PAPINEAU, LOUIS JOSEPH (1786-1871), Canadian politician; leader of Fr. party in Quebec Parliament.

PAPPENHEIM, GOTTFRIED HEINRICH, COUNT OF (1594-1632), Ger. soldier; famous cavalry general on Catholic side in Thirty Years War; left for dead on fieid of *Prague* 1620; field marshal, 1630; assisted in sack of Magdeburg, 1631; blamed for undisciplined fury as commander of cavalry at *Breitenfeld,* 1631; slain at *Lutzen.*

PAPPUS OF ALEXANDRIA (fl. III. cent. A. D.), Gk. mathematician; known chiefly by his great work of eight books, of which only part remain; also wrote commentaries on the works of Ptolemy; Diodorus, and on the *Elements* of Euclid; only fragments of the latter have survived. P.'s great work gives a systematic account of the most important results of earlier writers, together with additions and notes. The theorems on centres of gravity named after Guldinus are due originally to P.

PAPUA. See NEW GUINEA.

PAPUANS (from the Malay *papuwah,* 'woolly-haired'), a tall race, dark brown to black in color. Their origin is still disputed. They dwell in village communities in New Guinea, without

priests, or hereditary chiefs. Except for the converts to Islam and Christianity they are spirit worshipers and pagan; great boat-builders and house-builders. The P. are akin both to E. Africans and aboriginal Australians in many customs and habits. Polygamy is common amongst them, bnt there are certain prohibited degrees of affinity. Their numerals do not go beyond 5.

PAPYRUS (*Cyperus papyrus* = *Papyrus antiquorum*), a reed allied to the sedges, which grows abundantly along the banks of rivers in hot countries (*e.g.* the Nile). The shoots attain a considerable height and have an extremely graceful appearance, the leaves forming a pendent crown. The flowers are borne in spikelets enclosed by long bracts. The pith of the stem was utilised by the ancients in the manufacture of paper, being cut into strips, which, whilst still wet, were pressed together. Much valuable lit. is preserved to us in ancient papyri, some taking the form of rolls (*volumina*), whilst others were composed of flat sheets bound together bookwise. The oldest known specimens date from about the XXXV. cent. B.C. See PALAEOGRAPHY.

PAR, a word from the Latin, meaning equal. It is used to denote a state of equality or equal value. It is employed chiefly in connection with bills of exchange, stocks, bonds, etc.

PARÀ, GRÀO PARÀ (4° S., 52° W.), state, Brazil, bounded by three Guianas, Atlantic and other Brazilian states; area, *c.* 443,900 sq. miles; thickly wooded and well-watered region; communication carried on by rivers, chief of which, Amazon; principal towns, Pará (capital), Alemaquer, Breves, Braganca, and Obidos; considerable stock-raising; fruits and cacao cultivated; rubber, guttapercha, tonka beans, sarsaparilla, gums, and Brazil nuts produced. Pop. 1920 992,290.

PARÀ, BELEM, BELEM DO PARÀ (1° 28′ S., 48° 24′ W.), city, port, capital of Pará State, Brazil, on Pará River; well laid out, with several fine squares and gardens; notable buildings are XVIII.-cent. cathedral, bp.'s palace, episcopal seminary, theatre, municipal and government buildings, public library, and Museum. P. was founded, 1615, by Portuguese; scene of many revolts; connected with Braganca by rail; important centre of commerce, and entrepot for Amazon River trade. Pop. 275,167.

PARABLE, simple story with allegorical interpretation; popular since earliest times in Oriental countries; frequently employed in New Testament.

PARABOLA, the curve of section of a cone by a plane parallel to a generating line of the cone; or the locus of a point which moves so that its distance from a fixed point (*focus*) equals its distance from a fixed straight line (*directrix*)

PARACELSUS (*c.* 1490-1541), Ger. physician; the name given to himself by Theophrastus Bombast von Hohenheim. He was involved in many disputes, and, on becoming embroiled with the authorities, fled from Basel to Esslingen, and wandered, staying a few months at each place, in succession, to Colmar, Nuremberg, Appenzell, Zurich, Augsburg, and many other towns. Eventually he settled, in 1514, at Salzburg, under the protection of Abp. Ernst, and there in the same year he died.

Of some 360 works which he is said to have written, only from 10 to 24, according to different authorities, are admitted as genuine, the others being assigned to disciples. Collected editions and translations into Latin, English, and other languages were published during the XVII. cent., but are now very rare. The influence of P. was very great in encouraging the direct observation of nature, with experiment and research, in opposition to mere annotation of Galen and other ancient physicians, and scholastic disputation.

PARACHUTE, an apparatus by which descents may be made from airplanes, balloons or dirigibles; in shape it resembles an umbrella, and from its extremities metal stays are passed to the main upright to prevent it being turned inside out. Blanchard was first practical parachutist, 1793.

PARADISE (Gk. *paradeisos*), the place of future bliss of the righteous in Christian and other religions. The word is of Persian derivation, and the Hebrew derivative is used of an enclosed part of garden in the Old Testament.

PARADOX, a term applied to whatever is contrary to the received belief. It follows that a P. is not necessarily an opinion contrary to truth. There have been P's which have overthrown accredited errors, and in the course of time become universally accepted as truths, but this, the highest form of P., which is only another name for originality of thought, is rare.

PARAFFIN, a white, waxy substance obtained from the distillation of carbonaceous materials, principally petroleum, bnt also from wood, bituminous coal, etc. The crude petroleum is subjected to fractional distillation, by which

naphtha, kerosine, light mineral and heavy mineral oil are successively obtained, heat being applied just short of carbonization. The heavy residium is then cooled, whereupon the paraffin crystalizes and is then washed clean in benzine. It dissolves in hot olive oil, in oil of turpentine, benzol and ether, only slightly in boiling alcohol and not at all in water,aside from which it is unaffected by any other solvents. It melts at 180° Fahrenheit. It does not burn readily in the air, unless with the addition of a wick, when it gives so brilliant and smokeless a flame that it has been used in the manufacture of candles, rivaling those of the finest wax. In the manufacture of candles it is usually mixed with stearin. It is unaffected by the action of either acids or alkalis and is a perfect electric insulator.

PARAGOULD, a city of Arkansas, in Greene co., of which it is the county seat. Its industries include flour mills, lumber mills and foundries. It is the center of a fruit region, Pop. 1920, 6,305.

PARAGUAY, inland republic, S. America (20°-26° S., 54° 62° E.), bounded N. by Bolivia and Brazil, E. by Brazil, S. and W. by the Argentina. Republic is divided from N. to S. by Paraguay R., eastern portion being larger and more important; large tract to W. of river unexplored. Surface consists of undulating plains, low hills, swamps, and dense forests; higdest ground to be found in N. and E. The chief rivers are Paraguay,Pilcomayo, and Paraná. Soil is rich and fertile, vegetation luxuriant; leading industries are stock raising and cultivation of *yerba mate* (Paraguay tea), rice, sugar, tobacco, maize, and coffee; forsets produce fine timber, gums, dyes and oils. The chief articles of export are hides, timber, maté tobacco, quebracho extract, cattle, and meat products. Principal towns are Asuncion (cap.) and Villa Rica; inhabitants chiefly Spaniards and Indians. President is elected for four years. Paraguay was visted in 1515 by de Solis, and in 1526 by Cabot; colonized by the Spanish; from 1608 progress made under administration of Jesuits until their expulsion, 1768; declared independent (*c.* 1811); 1865-70, war against Brazil, Uruguay, and Argentina, resulting in complete defeat of Paraguay; frequent revolutions—*e.g.*, 1911-12. Area *c.* 171,200 sq. m.; pop. *c.* 800,000. See MAP S. A.

PARAGUAY, a river, in South America, which rises in Brazil, flows S. and joins the Paraná in the state of Paraguay after a course of 1,300 miles. It is an important highway of trade.

PARAGUAY, TEA. See MATE.

PARAHYBA, a province of Brazil, on the seacoast. It has an area of about 30,000 sq. miles. A part is covered with forest. Pop. about 600,000. The capital is Parahyba, on a river of the same name. about 11 miles from its mouth. Pop. about 40,000.

PARAHYBA DO SUL (21° 40′ S., 40° 50′ W.), river, Brazil, S. America; rises in state Sao Paulo; flows into Atlantic.

PARAKEET. See PARROT.

PARALDEHYDE ($C_6H_{12}O_3$), colorless liquid, with odor resembling ether and burning taste, obtained by the action of various acids or salts on aldehyde; used in med. as a hypnotic, especially to produce sleep in the insane and in patients with heart disease.

PARALLAX (Gk. *parallasso,* 'I vary'), the amount of apparent change in position of any distant object as seen fro m two points. Identical with p. is *Triangulation,* the former term being used in connection with Astronomy. The two eyes of a human being (and animals) form a parallax, and so enable us to judge distances. Theoretically, two observers at different parts of the earth, working in conjunction, might take the altitude and azimuth of a given star and, knowing the distance between their two stations, apply Triangulation and thus measure the distance of the star from the earth. However, in practice it is found that the distances of even the nearest stars are so vast that the diameter of the earth is useless as a base, and so observations are made after an interval of six months by the same observer, for in this time the earth will have made half a circuit of her orbit, which is thus used as a base. The majority of stellar distances are so immense, however, that even with this huge base (186 million miles) it is impossible to obtain parallaxes for the majority of the stars.

PARALLELEPIPED, a solid bounded by six faces, each of which is a parallelogram; the rectangular prism and cube are particular cases; the volume of any parallelepiped is obtained by multiplying the area of any face by the perpendicular distance between that face and the opposite one.

PARALLELISM (*Psycho - physical*), theory that every conscious process or variation of conscious process is accompanied by a corresponding nervous process or variation of nervous process.

PARALLELOGRAM OF FORCES.—When two forces act in different direc-

tions, not opposite, on a point P., the resultant or 'combined' force acting as one can be determined as to direction and magnitude by constructing a parallelogram, with sides representing two forces in direction and magnitude. The diagonal from the point of intersection gives the resultant. All vector quantities, such as velocities and displacements, are similarly determined.

PARALLELS, in military language, are trenches cut in the ground before a fortress, roughly parallel to its defenses, for the purpose of giving cover to the besiegers from the guns of the place. The P. are usually three, with zigzag trenches leading from one to another. The old rule was to dig the first at 600 yds. distance, but the improvements in artillery have rendered a greater distance necessary.

PARALLELS OF LATITUDE. See LATITUDE.

PARALYSIS, OR PALSY, condition in which there is loss or impairment of the power of voluntary muscular contraction or movement, the loss being either generalized in the muscles all over the body, or localized to one or several muscles. If there is injury or disease of the part of the brain controlling voluntary movement or of the motor tracts of the spinal cord loss of voluntary muscular power results; while if there is injury or disease of the anterior horn of grey matter of the spinal cord, of the anterior nerve roots, or of the motor nerve fibres to the muscles, there is, in addition to loss of voluntary muscular power, atrophy of the muscles supplied by the fibres concerned. Besides being due to injury or disease of nervous structures (*organic paralysis*), paralysis may be due to functional derangement of the part of the brain controlling voluntary muscular movement, as in such mental conditions as hysteria, or *functional motor paralysis*; in addition, paralysis may be due to injury or disease of the muscles themselves.

Hemiplegia—paralysis affecting one side of the body—is due to a lesion of some part of the motor tract in the brain above the medulla oblongata. The chief causes are, when the onset has been sudden, injury, haemorrhage, embolism (blocking of a cerebral artery), thrombosis (clotting of the blood in a cerebral artery, due usually to disease of its wall); and when the onset has been gradual, a tumour of the brain, altered states of the blood (*e.g.*, in anaemia, diphtheria), abscess, chronic cerebral meningitis, or chronic degenerations of the nervous system.

Paraplegia—paralysis of both legs—is due usually to disease or injury of the spinal cord. The more common causes are pressure on the spinal cord as a result of injury or disease of the spine (*e.g.*, fracture, curvature, or caries), and injury or disease of the cord itself (tumours or acute or chronic inflammation).

Infantile Paralysis (*Acute Anterior Poliomyelitis*) is a form often occurring in young children due to an acute inflammation of the anterior horn of grey matter of the spinal cord. The legs are usually first affected, but all the limbs or only a group of muscles may be implicated, and the muscles soon atrophy.

Progressive Muscular Atrophy is the result of chronic inflammation with sclerosis of the anterior horn of grey matter. It is a disease usually of adult life, in which there is slow and gradual atrophy of groups of muscles, commencing generally in one or both arms, at the muscles of the hand. A characteristic feature of the disease is the peculiar fibrillary twitchings of the affected muscles.

Bulbar Paralysis, due to disease of the medulla oblongata or bulb, occurs most often in old persons, and is frequently associated with chronic diseases of the spinal cord. It is characterized by gradual paralysis and atrophy of the muscles concerned in speaking, mastication, and swallowing (*i.w.*, of tongue, lips, pharynx, etc.), and is accompanied by difficulty in articulation, eating, swallowing, and sometimes in breathing. It invariably ends fatally, either from inanition or from pneumonia or similar complications.

Pseudo-hypertrophic Paralysis (*Progressive Muscular Dystrophy*) is a hereditary disease, usually affecting boys, transmitted through the females of a family who are not themselves affected. There is progressive weakness, with hypertrophy of some muscles and atrophy of others. Where the muscles are apparently enlarged there is really atrophy of muscle fibres, with increase of fibrous tissue and fat, the muscles of the calves and buttocks being those which are generally much hypertrophied. The essential changes are, therefore, not in the nervous system, but in the muscles themselves.

Parkinson's Disease (*Paralysis agitans*), is a chronic affection, usually occurring after the age of fifty, characterized by progressive weakness, rhythmical tremors of certain muscles, a distinctive attitude, the body being bent forward, and a peculiar gait, at first slow and then trotting. Believed to be due to senile condition of the brain cortex.

General treatment of paralysis includes rest in bed, maintaining the strength of the body, regulation of nutrition and of the excretions, careful attention to the action of the heart and of the lungs, regular sound sleep must be ensured, and for these purposes stimulants and other drugs are given as required. Massage and passive movement are of benefit after acute symptoms have disappeared, and electricity is often of value in maintaining the nutrition of atrophied muscles.

PARAMARIBO (6° 50′ N., 55° W.), capital, Dutch Guiana, on Surinam; exports coffee, sugar. Pop. 1920, 50,560.

PARAMATTA, PARRAMATTA (33° 40′ S., 151° E.), town, on Paramatta, New South Wales, Australia; trade in fruit. Pop. 1920, 12,630.

PARANÄ.—(1) A city of Argentina, cap. of the prov. of Entre Rios, on the Paraná, facing the town of Santa Fé, 400 miles by river from Buenos Ayres. It is a bishop's see and the seat of a university. Pop. 30,000. (2) A state of Brazil on the S.E. coast, with an area of 85,450 sq. miles., and a pop. of 350,000. Cap., Curityba. (3) A great river of S. America, formed by the confluence of the Rio Grande and the Paranahyba. The Rio Grande rises in the state of Minas Geraes, Brazil, and flows N.W. and W. to the point of confluence. As the P. the two rivers then flow in a S.W. direction through Brazil, then S., forming the boundary between Brazil and Paraguay. Thence it sweeps W. between Paraguay and Argentina to receive its principal tributary, the Paraguay. It then flows S.W. to Rosario and S.E. to unite with the Uruguay in the Plata estuary. Cataracts and rapids render it unfit for navigation over a large part of its course, but for the last 1000 miles, it is always navigable even by large steamers. Its total length is over 2,000 miles, excluding the Rio Grande, its true headstream.

PARANOIA, term to define a type of insanity which is characterized by a marked and permanent delusion, while the affected person may be in other respects sane. In persons thus affected there is nearly always a hereditary tendency to mental or nervous derangement, and the condition is of slow and gradual evolution.

PARASANG, a measure of length often alluded to by the Greek writers and still used in Persia. Strabo speaks of it as being variously reckoned by Persians at thirty, forty, or sixty stadia. The length usually taken is about three and one-half m., which agrees with the estimate made by Herodotus and Xenophon, of thirty stadia.

PARASITIC DISEASES is a term now much more comprehensive than a few years ago. Many are caused by bacteria, others by vegetable parasites of a somewhat higher type, while others again are due to parasites which are low forms of animal life. In certain diseases, in all probability of parasitic origin, the precise etiology is still obscure; while there are other diseases, such as some forms of anaemia, which, while they may be the result of the presence of animal parasites in the intestine, can hardly be included under the heading.

The diseases (dealt with under separate headings) may be arranged as follows: (*a*) those caused by vegetable parasites, including (1) those due to the pyogenic micrococci: Erysipelas, Gonorrhoea, Septicaemia; (2) those due to specific bacilli: Anthrax, Cholera, Diphtheria, Leprosy, Plague, Pneumonia, Relapsing Fever, Tetanus (which is indicated by a violent spasm leaving rigid many of the muscles—*e.g.*, lockjaw); Tuberculosis, Typhoid Fever, Yellow Fever; (3) those due to higher forms of vegetable life: Actinomycosis, Madura foot, occurring in India and characterized by enlargement of feet and hands, with suppuration and discharge —also known as fungus-foot, from its cause; (*b*) those caused by animal parasites, including (1) those due to protozoa: Dysentery, Malaria, Syphilis; and (2) those due to higher forms of animal life; hydatids, or aqueous cysts, found usually on the liver and caused by the larval form of the liver fluke; (*c*) those infective diseases (1) in which, although a micro-organsim has been found, it has not been absolutely proved to be the cause of the disease: Hydrophobia, Scarlet Fever; (2) those which have not been proved to be caused by micro-organisms, although in all probability caused by them: Measles, Mumps, Smallpox, Whooping Cough, Typhus Fever.

PARASITISM, a type of interrelationship between plants or between animals, in which one of a pair nourishes itself at the expense of the other.

Amongst animals, both external and internal parasites frequently possess hooks or suckers for attachment, and almost all parasites, plant and animal alike, exhibit traces of degeneracy from their nearest free-living relatives—many internal animal parasites losing eyes, mouth, digestive organs, etc.

PARASNATH (23° 58′ N., 86° 11′ E.), hill, Chota Nagpur Division, Bihar and Orissa, India; place of Jain pilgrimage.

PARAVANE, device adopted during World War for (1) destruction of submarines, (2) protection of vessels from mines. Several persons have claimed its invention or adaptation.

(1) *Destructive Pavarane.*—A torpedo-shaped body carrying near its head large steel plane and near its tail horizontal and vertical fins. Plane set at small angle to central line of paravane and towed in approximately v e r t i c a l position. Thrust of water on plane when vessel in motion carries it away from fore-and-aft centre line. A paravane is towed on either side of vessel, and thus a spread of some 200 ft. is attained. Charged with 300 lb. of T.N.T. and towed at depth of about 200 ft. When submarine encountered, charge is exploded by electric current along towing wires. Proved effective, but was greatly inferior in destructive power to depth-charges.

(2) *Protective Paravane.*—Introduced and subsequently as 'otter' system applied to merchant ships. Each paravane towed from point as far forward and as low down as possible by means of specially constructed steel wires. Paravanes fitted with hydroplanes, which exerted heavy pull on wires, and formed wedge kept in position by dynamic reaction of water. When mine moorings were struck by towing wires, mines deflected away from ship and, passing along wires to cutting jaws at head of paravane, were instantaneously severed. As sinker of mines dropped to bottom, mine floated and was destroyed by gun-fire.

PARAY-LE-MONIAL (46° 27′ N., 4° 9′ E.), town, Saône-et-Loire, France; place of pilgrimage. Pop. 4,500.

PARCEL POST. See Post Office.

PARCHIM (53° 26′ N., 11° 41′ E.), town, on Elde, Mecklenburg-Schwerin, Germany; paper-mills. Pop. 1919, 11,435.

PARCHMENT, a writing material of great antiquity made from the skins of animals. In Asia among the Persians and Jews skins were universally used, and therefore Varro is not justified in saying that p. was an invention of Eumenes II. of Pergamum on the prohibition by Ptolemy Epiphans of the exportation of papyrus. In Rome p. was chiefly for wills and notes, while papyrus was used for literary work. P. is chiefly made from sheep-skin; vellum, a finer kind, is made from calf-skin. See Palaeography.

PARDO BAZÃN, EMILIA, COUNTESS OF (1851-1921), Spanish novelist, critic, and woman suffrage leader; *b.* Coruna, Spain; married Senor D. José Quiroga in 1868. She settled in Madrid after travelling in Europe and established a review. Her novels reflected strongly the influence of Zola, though her realism is more Spanish than French. Her best known works are *Los Pazos de Ulloa* and *La Madre naturaleza*, both published in 1886. Her essays and criticism dealt with the realism and naturalism of modern novels and other literary studies. She was created a countess in 1908 and two years later became a member of the Council of Public Instruction.

PARDON, in England, is the prerogative of the Crown, only exercised upon the advice of the Home Sec.; in Scotland, of the Sec. for Scotland. It may be granted before or after trial and sentence. A free Pardon from the Crown is given to release an innocent person from prison after a miscarriage of justice. The commutation of a death sentence to penal servitude is in form a Pardon. In the United States, the President and the Governors of States have the power of Pardon.

PARDUBITZ (50° 3′ N., 15° 46′ E.), town on Elbe, Bohemia, Austria; sawmills, iron foundries. Pop. 1921, 25,171.

PARÈ, AMBROISE (1510-90), Fr. surgeon, apprenticed to a barber-surgeon and trained at Hôtel Dieu; served as army surgeon; introduced treatment of gunshot wounds by bandaging in place of cauterisation by boiling oil, and prevented haemorrhage by ligaturing arteries; author of an *Anatomy* and other medical works.

PAREGORIC, or **PAREGORIC ELIXIR,** known in the British Pharmacopoeia as compound tincture of camphor, is a mixture of an alcoholic solution of opium, benzoic acid, camphor, and oil of anise. It is used in making cough mixtures, and is useful in cases of rheumatism. Its popular use for relieving children suffering with pains in the stomach and bowels is harmful, and should be discouraged.

PARENT, the relationship between children, and father and mother. Parents are compelled by law to educate, maintain and defend their children in civilized countries. During the minority of the child, they have interests in the profits of their labor in case the children live with and are provided for by them. Parents have no interest in the real or personal estate of a child otherwise than as guardian.

PARENZO (45° 14′ N., 13° 37′ E.), port, Istria, Austria; seat of R.C. bishopric; has fine basilican cathedral, built VI. cent.; Rom. remains. Pop. 13,000.

PAREPA-ROSE, MADAME (1836-1874), a Scotch opera singer; *b.* in Edinburgh. She first appeared in public in 1855, and was immediately successful. She sang in England, in 1857, and in the United States, in 1866. She was one of the most successful opera singers of her day.

PARES, SIR BERNARD, Eng. prof.; pub. *Russia and Reform* 1907; chapters on Russian in *Cambridge Modern History, Day by Day with the Russian Army,* 1915 etc.

PARESIS, See INSANITY.

PARGA (39° 16′ N., 20° 51′ E.), seaport, vilayet of Janina, Albania. Pop. 5,000.

PARHELION, a false sun, which has the appearance of the sun itself, and is occasionally seen by its side, sometimes in double and triple form. They are due to certain modifications of light when falling on crystals of ice, raindrops, or clouds.

PARIA, GULF OF, an inlet of the Caribbean Sea, between the island of Trinidad and the mainland of Venezuela.

PARIAH, in Tamil, signifies 'outcast'; used of low-born Hindus; also used of) mongrel curs which infest Eastern cities.

PARIAH DOGS. See DOG FAMILY.

PARIAN MARBLE. See MARBLE.

PARINI GIUSEPPE (1729-99), Ital, poet whose writings are characterized by strong moral tone; admirer of Alexander Pope; works include *Odi* and *Giorno*; wrote excellent blank verse.

PARIS, a genus of herbaceous perennials (order Liliaceae), with a stout rhizome and erect stem, bearing four whorled net-veined leaves, and a solitary green flower followed by a berry-like fruit. The only British species is herb P., or truelove knot (*P. quadrifolia*), a rather uncommon plant found in woods. The berry is black. *P. polyphylla* bears yellowish-green flowers, which are succeeded by bright red berries. This is sometimes grown in gardens. Its perianth is normally in eight reflexed parts, four large and lanceolate, and the alternating four small and narrow.

PARIS, cap. of France and of Seine dep. (48° 50′ N., 2° 20′ E.); largest city of continental Europe; beautifully situated on both sides of Seine; fortress; important railway, river road, and canal centre; claims to be the world's most intellectual and artistic city; and its magnificent architecture, handsome streets, statues, art treasures, educational institutions, romantic history, places of entertainment, cafés, restaurants, and unique atmosphere give the city an irresistible appeal to people of all nations.

The Seine divides the city into two regions, the right and left banks—*Rive droite* and *Rive gauche*—and is crossed by thirty-two bridges—notably Pont Neuf, 1578, Pont Notre-Dame, Pont d'Iéna, Pont d'Austerliz, Pont de la Concorde, and Pont Alexandre III., 1896 1900. The heart of Paris is the Ile de la Cité in midstream, with famous Gothic cathedral, Notre-Dame (13th cent.; two fine square (towers, 225 ft, high, and central spire, 300 ft.;) beautiful stained glass); here Napoleon was crowned emperor by Pope Pius VII. 1804; the palais de justice and exquisite Sainte-Chapelle (13th cent.); Hôtel-Dieu; prefecture of police. Paris proper is encircled by a wall (obsolete fortifications), built abont 1840 and now in course of destruction, and the Ceinture Railway. The Boulevard St. Michel, continued by Boulevard de Sebastopol and Boulevard de Strasbourg, crosses Paris from S. to N.; this main artery is intersected at right angles by the Boulevard Montparnasse, Boulevard St. Germain, Rue de Rivoli, and the) Grands Boulevards and other leading thoroughfares. City is comparatively flat, with exception of hill of Montmartre, with Sacré-Coeur and quaint artists' quarters of hill of Buttes-Chaumont and Montagne Ste. Genevieve, with univ. and Pantheon.

On r. bk. are many handsome squares, including Place de la Concorde at entrance to Champs Elysées, with famous obelisk of Luxor (73 ft. high) in centre, where Louis XVI., Charlotte Corday, Marie Antoinette, Robespierre, and many others were guillotined; Place du Carrousel, surrounded on three sides by Louvre, with Arc de Triomphe on W. forming entrance to Tuileries; Place Vendome, with Napoleon column of victory; Place de l'Etoile, with beautiful Arc de Triomphe, 1806-36, 150 ft. high, 137 ft. broad, covered with fine reliefs: twelve avenues radiate from this magnificent square, including the Champs Elysées, the most fashionable promenade of Paris, with President's residence—L'Elysée; Place de la Bastille, with Colonne de Juillet. Other fine squares are Place de la Nation, Place de l'Opera, Place de l'Hôtel de Ville, Place de la Republique, etc. On l. bk. is the large Champ de Mars, with Eiffel Tower (984 ft.).

Outstanding features on r. bk. of Seine are Palais du Louvre, extending about ½ m. along the river (built as fortress, 1204; rebnilt, 1541) with world-famous art collections—left wing con-

tains the Treasury; site of Palace of the Tuileries (begun, 1564; burnt down by Communards, 1871), with fine Jardin des Tuileries; Palais Royal, built by Richelieu, the most fashionable promenade and shopping centre ni 18th cent., now a deserted square; the churches St. Germain l'Auxerrois (12th-16th cent.), St. Eustache (16th cent.), St. Gervais (16th cebt.), La Madeleine, 1806-24, in Corinthian style, with sixty-two columns; Hôtel de Ville (munic. headquarters); Conservataire des Arts et Métiers; the old Tour St. Jacques; Musée Carnavalete (historical museum); Porte St. Denis and Porte St. Martin; Halles Centrales (markets); Bourse; Bibliothéque Nationale; Grand Opera (1861, largest in world); Opera-Comique; Thèatre Francais; Petit Palais and Grand Palais (exhibition buildings, built 1900); Trocadero (1867, in Oriental style), with museums of sculpture and ethnography; Parc Monceau.

On l. bk., opposite the Ile de la Citè is the Latin quarter, with Sorbonne (univ., founded 1253), College de France, Ecole de Mèdecine, Ecole des Beaux-Arts, and other educational institutions; Musèe de Cluny, with collection of antiquities; Panthèon, 1764, with fine frescoes and tombs of Voltaire, Victor Hugo, Rousseau, etc.; St.-Etienne-du-Mont, a beautiful mediaeval church; Luxembourg, 1616-20, which includes the Palace of the Senate, a fine modern art gallery, and beautiful gardens; Odeon (theatre); St. Sulpice (16th cent.); Saint-Germain-des-Pres, 1163; Hôtel des Monnaies (Mint); Palais de l'Institut; Palais-Bourbon (seat of Chamber of Deputies); Hôtel des Invalides, with tomb of Napoleon I.; Jardin des Plantes, with fine botanical and zoological gardens; Salpètrière (famous hospital).

Chief cemeteries are Pere Lachaise, Montmartre, Montparnasse; interesting catacombs and remarkable sewers. Round Paris lie beutiful wooded slopes, with suburbs of Versailles, Saint-Cloud, Meudon, Sevres, Saint-Denis, Montreuil, Vincennes, etc.; the famous Bois de Boulogne, with Jardind' Acclimatation and Longchamp (racecourse), and Bois de Vincennes.

For administrative purposes Paris is divided into twenty arrondissements, each comprising four quarters, each quarter is represented by one member in Conseil Municipal and Conseil General of dep. of Seine; mayoral functions are shared by prefect of Seine and prefect of police. City has an extensive system of communications; suburban circular railway, underground electric railways (*Metropolitain*), motor buses, etc. Principal industries: ladies' clothes, hats, boots, shoes, furniture, jewellery, bronzes, mirrors, clocks, watches, decorative articles, scientific intruments, book publishing, object d'art.

History.—In earliest times Paris was known as Lutetia; cap. of the Gallic tribe Parisii, in Ile de la Citè. Under Roman rule Lutetia became a prominent town. Christianity was established in 3rd cent.; in 4th cent. town took the name of Parisia or Paris. In 451 Ste. Geneviève preserved town from Huns. Clovis made it cap. of his realm, 508; attacked by Northmen (9th cent.); became residence of Hugh Capet and permanent cap. of France, 987; during reign of Philippe Auguste, 1180-1223, Notre-Dame was begun, castle of the Louvre built, univ. founded, and city surrounded by strong wall; Charles V. 1337-80, erected Bastille; revolt of the Maillotins, 1382; between 1412 and 1418 the government was alternately held by Burgundian party (known as Cabochiens) and Armagnacs; in 1420 crown of France passed to England and city was held by English until 1436; unsuccessfully besieged by Joan of Arc, 1429; massacre of St. Bartholomew, 1572; besieged by Henry IV. 1594. Louis XIV., Louis XV., and Louis XVI. did much to beautify Paris, which became the centre of European civilization. Paris was chief scene of Fr, Revolution, 1789; Bastille stormed (July 14); Allies entered Paris, 1814; Napoleon I. resigned, and First Treaty of Paris signed, followed by Second Treaty of Paris, 1815; fresh revolutions, 1830, 1848. Peace of Paris, 1856, ended Crimean War. During reign of Napoleon III. the city was richly adorned by avenues, squares planned by Haussmann, and handsome buildings; besieged by Germans (Sept. 19, 1870); capitulated (Jan. 28, 1871). During Commune 1871 numerous fine buildings were destroyed; great fire in Opera-Comique, 1887; Treaty of Paris, 1898 ended Span.-Amer. War; International Exhibitions, 1855, 1867 1878, 1889, 1900; disastrous floods 1910.

The pop. of Paris was 2,906,472 in 1921. The demolition of the fortifications will give more building space to the congested city.

During World War, 1915-18, Paris was frequently raided by aircraft. From March 1918 it was intermittently shelled by a Ger. long-range gun 75 miles distant. The damage done by all these bombardments was but slight but casualties were fairly heavy, notably on Good Friday 1918, when a shell fell on the church of Saint-Gervais during a service, killing or injuring over a hundred people. In the course of the war projectiles thrown into the city totalled 1,049, causing 256 deaths and

wounding 620 people. Frequent Allied war councils were held in the city, which was also the scene of the Peace Conference in 1919. In 1919 and 1920 Paris was the scene of many impressive ceremonies relating to the war. These included a grand review in 1919, and the burial of the Unknown Soldier in 1920.

PARIS, a city of Illinois, in Edgar co., of which it is the county seat. Its industries include the manufacture of lumber, flour, brooms, gloves, etc. It has also railroad car shops. Pop. 1920, 7,985.

PARIS, a city of Kentucky, in Bourbon co. It is on Stover Creek. It is the center of) an important tobacco growing and live stock region. Pop. 1920, 6,310.

PARIS, a town in Texas, in Lamar co. It is on the Texas and Pacific, the Texas Midland, and other railroads. Its industries include the manufacture of furniture, ploughs and cottonseed oil, brick, wagons, etc. It has a court house, hospitals and several private schools. Pop. 1920, 15,040.

PARIS (classical myth.), *s.* of Priam of Troy; awarded prize of beauty to Aphrodite, thereby offending Hera and Athene; stole Helen from Menelaus, causing Trojan War; killed Achilles by treachery.

PARIS BLUE, a bright color, obtained ny heating to a high temperature rosaniline, aniline, and some benzoate acid.

PARIS, BRUNO PAULIN GASTON (1839-1903) Fr. scholar; apostle of Romantic school; his researches in Mediaeval Fr. lit, were epoch-making.

PARIS, DECLARATION OF. With the object of introducing uniformity into the usages of maritime warfare, the plenipotentiaries of) the various powers who were parties to the Treaty of Paris of 1856, after the Crimean War, agreed on the following articles, known as the Declaration of Paris: (1) Privateering is, and remains, abolished; (2) the neutral flag covers enemy's goods, with the exception of contraband of war; (3) neutral goods, with the exception of contraband of war, are not liable to capture under the enemy's flag; (4) blockades, in order to be binding, must be effective—*i.e.*, maintained by a force sufficient really to prevent access to the coast of the enemy. The declaration was not acceded to by the U.S. or Venezuela, nor as to the first clause by Spain or Mexico; but in 1898, on the outbreak of war between Spain and the U. S., both belligerents bound themselves by the full terms of the declaration.

PARIS GREEN, a preparation of copper and arsenic, used as an insectide on plants.

PARIS, LOUIS PHILIPPE ALBERT D'ORLÈANS, COMTE DE (1838-94), grandson of King Louis Philippe, and, in 1842, heir-apparent; abandoned claim, 1873, to Comte de Chambord, who *d.* 1883; lived and wrote a good deal in England. See ORLEANISTS.

PARIS, PLASTER OF. See GYPSUM.

PARIS, TREATIES OF (1814-15)—(1) May 30, 1814; Talleyrand, on behalf of Louis XVIII., agreed (to restore Fr. conquests made since 1791; Ger. empire was abolished, Belgium and Holland united, Italy parted asunder, Swiss independence guaranteed. (2) Nov. 20, 1815, more harsh towards France, because of the Hundred Days; territory to be that of 1789, war contribution of 700,000,000 francs to be levied, and garrisons of 150,000 men maintained on frontiers for 5 years. See FRANCE (HISTORY).

PARISH (Gk. *paroikia*) at first a district presided over by a bp.; after about 400 A.D. generally used as now of a smaller district with one priest.

PARK, CHARLES CALDWELL (1860), an American author, *b.* at Allegheny City, Pa., *s.* of James and Sarah Gray Park. He was educated at Cornell University, Bellevue Hospital Medical College, and at the universities of Vienna and Heidelberg. He began to practice in New York City in 1888 but removed to California in 1893. Later he raised money in Pittsburg, Pa., to establish and maintain the 'Fort Duquesne Cafe' and was in charge of same during 1918-19 under the auspices of the Y.M.C.A., with A.E.F. in France. Author: *The Plaything of the Gods*, 1912, also *Tales of Old California.*

PARK, MUNGO (1771-1806), Scot. African explorer; sent by African Association to explore valley of Niger, 1795; carried out two years' often solitary exploration; first modern European to reach the Niger, 1796; delayed by illness and imprisonment and believed to be dead; returned, 1799, and wrote famous *Travels*, model in this kind of writing; sent out by Government, 1805; slain with all his men; fate not known till 1812.

PARK, ROBERT EZRA (1864), an American sociologist, *b.* in Luzerne Co., Pa., *s.* of Hiram Asa and Theodosia Warner Park. He was educated at the University of Michigan, Harvard University and at Heidelberg University. After 11 years of newspaper work he studied and traveled in Europe from

1899-1903, was assistant in philosophy at Harvard during 1904-5, then from 1905-14 was engaged in educational work, mostly among negroes after which he became a lecturer on, sociology at the University of Chicago. Author: *Old World Traits Transplanted*' (with Herbert A. Miller), 1921 and *The Immigrant Press and Its Control*, 1922.

PARKER, ALTON BROOKS (1852), American jurist; *b.* in Cortland, New York, May 14, 1852. He graduated at the Cortland Normal School and the Albany Law School; was admitted to the bar, and began practice in Kingston, N.Y. Elected surrogate of Ulster County in 1877 he was re-elected for the succeeding term. In 1884 he was a delegate to the Democratic National Convention, and in the following year declined the appointment of postmaster-general offered him by President Cleveland. In the same year he was Chairman of the Demoratic State Committee and appointed justice of the Supreme Court of New York State to fill a vacancy, being elected in 1885 without opposition. In 1889 he was appointed to the second division of the Court of Appeals and after it was dissolved became member of the General Term of the First Department. In 1896 he was a member of the Appellate Division. In 1897 he became Chief Justice of the Court of Appeals, resigning in 1904 to accept the Democratic nomination for president. The election resulted in his defeat; Theodore Roosevelt receiving 336 electoral votes to his 140. He then began law-practice in New York City and was engaged in notable cases such as the drug trust, for Mayor McClellan against Hearst when the latter sought a recount of votes after the election., and he was of chief counsel in the Sulzer impeachment trial. President the American Bar Association, 1906. Second vice-president of New York County Lawyers Association, 1907 and re-elected. President of the State Bar Association 1913-1914. Temporary chairman of the Democratic National Committee, 1912, 1st vice-president of the Academy of Jurisprudence, 1914, Vice-president of the League to Enforce Peace, President of the Civic Federation, 1919.

PARKER, DAINGERFIELD (1832) Brigadier-General, United States Army. *B.* at New Rochelle, New York. Educated at private schools. 1861-1884 served as subaltern and captain in 3rd United States Infantry and in 1889 promoted to major. In 1894 lieutenant-colonel and colonel to 1896 when retired, Promoted brigadier-general, United States Army, retired, by act of 1904. Participated in leading battles of the Civil War and commanded Fort Slocum in Early's attack on Washington. Commander of the Military Prison at St. Louis and commanded troops at the opening of Cherokee strip.

PARKER, EDWARD MELVILLE (1855), Bishop. *B.* at Cambridge, Mass, Graduated from Keble College, Oxford, England in 1878. In 1879-1906 a master at St. Paul's School. Consecrated in 1906, bishop coadjutor of New Hampshire and succeeded as bishop of New Hampsdire in 1914.

PARKER, EDWARD WHEELER (1860), an American statistician, *b.* at Point Deposit, Md., *s.* of William Price and Henrietta Hyde Donnell Parker. He was educated in public schools and at City College, Baltimore. In addition to being statistician of the U. S. Geol. Survey from 1891, and director of the anthracite bureau of information, Phila, from 1915, he was an expert special agent of the 12th U. S. Census, a member of the Anthracite Coal Strike Commission in 1902 and expert in charge of history of mining in the U. S. for the dept. of economics and sociology, Carnegie Institution. Anthor: *Annual Reports on Production of Coal in United States* etc.

PARKER, GEORGE FREDERICK (1847), an American journalist, *b.* at Lafayette, Ind., *s.* of Thomas W. and Eliza Ann Kirk Parker. He was educated in public schools in Iowa and at the University of Iowa. He entered journalism in 1873 and afterwards edited papers in Iowa, Indiana, Washington, D. C., New Hampshire, Pennsylvania and New York City, and was the first managing editor of the New York Press, 1887-8. He was also United States consul at Birmingham, England, 1893-8. He contributed to the London Times for 10 years, and also to many magazines both in the United States and abroad. Author: *Recollections of Grover Cleveland*, 1909.

PARKER, SIR GILBERT (1862) Eng. author and politician; *b.* and educated in Canada; travelled widely in South Sea Islands and Near and Far East; joint editor, *The Sydney Morning Herald*, 1886; M.P. Gravesend, 1900-18 organized Imperial Universities Conference, London, 1903; had charge of Amer. Publicity Department for two and a half years after outbreak of war knighted, 1902, baronet 1915; distinguished for his tales of Canadian life past and present. His novels include *Pierre and his People*, 1892; *When Valmond came to Pontiac*, 1895; *The Seats of the Mighty*, 1896; *The Weavers*

1907; *The Money Master*, 1915; *The World for Sale*, 1916; *Wild Youth* 1919; *No Defence*, 1920. He has also written poems, *A Lover's Diary*, and plays, *The Vendetta*, 1889; *No Defence*, 1889.

PARKER, HERSCHEL CLIFFORD (1867), an American physicist, *b.* in Brooklyn, N. Y. In 1890 graduated from the Columbia School of Mines. Until 1911 at Columbia as assistant in physics, tutor, instructor, adjunct professor and professor of physics. Was an explorer for many years in British Columbia and Alaska. Anthor of *A Systematic Treatise on Electrical Measurements*, 1897; He wrote many scientific and mountaineering articles. From 1903-1907 research work on incandescent electric lighting. He was one of the discoverers of 'Helion' and invented the 'Helioscope'.

PARKER, HORATIO NEWTON, (1871), an American bacteriologist, *b.* at Cambridge, Mass., *s.* of Horatio G. and Harriet Newton Parker. He was educated at the Massachusetts Inst. Tech. After being assistant biologist of the Boston Water Works and assistant and chief biologist of the Metropolitan Water Works, he was health officer at Montclair, N. J. from 1901-4, assistant hydrographer and assistant engineer of the U. S. Geol. Survey, from 1904-10, dairy bacteriologist of the University of Illinois 1910-17 and in 1918 became city bacteriologist and chemist of Jacksonville, Fla. Author: *City Milk Supply*, 1917.

PARKER, HORATIO WILLIAM (1863-1919), Composer. *B.* at Auburndaie, Mass. Educated in Auburndale and Europe. From 1885-1887 professor of music at the Cathedral School of St. Paul, Garden City, Long Island and 1888-1893 organist at the Holy Trinity Church, New York. In Boston at Trinity Church, 1893-1901. Since 1894 was professor of theory of music at Yale College. Awarded $20,000 in prizes for his operas 'Nona' and 'Fairyland'. Anthor of: Cantatas—*King Trojan*, *The Kobolds*; oratorios—*Hova Novissima*, 1898; *St. Christopher*, 1898; *A Wanderer's Psalm*, 1900. At the Festival of the Three Choirs, England in 1899, his Hora Novissima was performed, being the first American composition on one of these Festival Programs.

PARKER, SIR HYDE, BART. (succ., 1782) (1714-83), Brit. vice-admiral; fought in Seven Years and Amer. Wars. His *s.*, the admiral Sir Hyde Parker 1739-1807, commanded Baltic fleet, 1801, and vainly gave signal for Nelson to retreat at *Copenhagen*.

PARKER, JAMES (1854), Army Officer. In 1876 graduated from the United States Military Academy. Commissioned second lieutenant of the 4th Cavalary in 1876 and rose through the various grades to major-General in 1917. In 1876-1877 served in Indian Territory and on Mexican Border, 1878-1879. In Ute campaign, Colorado, 1879-1881 1885-1886 Geronimo Apache campaign at Arizona. From 1894-1898 at West Point as instructor of cavalry. Served in Philippine insurrection and Spanish American War. 1904-1905 adjutant-general Northern Division of United States Army and 1905-1906 director of the Cavalry School at Fort Riley, Kansas. In 1912 went to Europe on cavalry reorganization board. From May until August, 1917 commanded and trained all troops in department of Texas. In World War in action near Armentieres, Saint Quentin, and at Chemin des Dames. Awarded the Congressional Medal of Honor for bravery in Philippine Islands. Author of: *The Mounted Rifleman*, 1916.

PARKER, JOSEPH (1830-1902); Congregationalist minister; founder of City Temple.

PARKER, LOTTIE BLAIR, Author, playwright. *B.* at Oswego, N. Y. Graduated from the Oswego Normal School. On the stage in several stock companies. Entered a prize contest of a New York paper (and won honorable mention, with a play. The same play was produced later (at Lyceum Theatre. Author: *Homespun* (novel), 1909; (plays) *Way Down East*, 1897 which was made into a moving picture in 1922; *Under Southern Skies*, 1901; *A War Correspondent*; *Lights of Home*, *The Redemption of David Corson* (dramatization of novel by Charles Frederick Goss). Author of numerous one act plays.

PARKER, MATHEW (1504-75), abp. of Canterbury; chaplain to Anne Boleyn, 1535; influenced by Ger. Reformation, P. was consecrated abp., 1559; on the validity of his consecretion depends that of Anglican orders; P. was Elizabeth's chief tool in carrying out the new Anglican *via media*; helped to draw up the Thirty-nine Articles; made a valuable MS. collection now in Corpus Christi Coll., Cambridge.

PARKER, THEODORE (1810-1860), Unitarian theologian and reformer; *b.* Lexington, Mass., *d.* Florence, Italy. He graduated from Harvard Divinity School in 1836, was ordained the next year and installed as pastor of the West Roxbury Unitarian Church. He became the storm center of a heated religious

controversy, contributing a sermon in 1841 in Boston that was viewed as epoch-making in the Unitarian movement. His Christianity, which was anti-supernatural, conceived of Jesus as purely humanitarian. As a Bible critic, his views anticipated the results of later orthodox scholarship. Unitarian antagonism sundered) his relations with that church and from 1846 to 1859 he preached to great congregations in Boston public halls as minister of the Twenty-Eighth Congregational Society, formed in (the first-named year. He *d.* of consumption. His writings including publications of his many sermons, form a considerable bibliography.

PARKER, WILLARD (1800-1884), surgeon; *b.* Hillsborough, N. H. He graduated from Harvard Medical School in 1830 and served successively as professor of anatomy at the Vermont and Berkshire Medical Colleges, afterwards becoming professor of surgery at the latter institution. In 1837 he studied in London and Paris hospitals, and later was appointed professor of surgery at the New York College of Physicians and Surgeons, a post he held for thirty years. He became notable for several important discoveries in practical surgery and in nerve troubles.

PARKER, SIR WILLIAM (1781-1866), an English admiral, the *grandson* of Sir Thomas P. (*c.* 1695-1784). He entered the navy in 1793, and served in the Channel fleet under Lord Howe, subsequently coming under Sir Hyde Parker (1739-1807). He protected British interests on the Tagus during the Civil War of 1834, and on his return to England was made lord of theAdmiralty. In 1841, he was appointed commander-in-chief in China, and having captured Amoy, Ningpo, Woosung, and Shanghai, brought the war to a successful conclusion by seizing Ching-kiang-foo. He was in command of the Channel fleet in 1846, and commander-in-chief at Devonport, from 1854-57, and rose to the rank of admiral, in 1863. He was created a baronet in 1844.

PARKER, WILLIS ALLEN (1875), an American sociologist, *b.* at Vienna, Ill., *s.* of Rev. Isaac A. J. and Jemima Clary Parker. He was educated at Eureka College. He was ordained a minister of the Disciples of Christ in 1900 and was pastor at Emporia, Kansas until 1909, then after being an instructor in psychology and professor of philosophy at various colleges and universities, he was an exchange lecturer in philosophy at Columbia, 1918-19, director of the Community Service, New Haven, Conn., 1919-20, after which he became field representative of the Community Service Inc.

PARKERSBURG, a city of West Virginia, in Wood co., of which it is the county seat, It is on the Baltimore and Ohio Southwestern, the Baltimore and Ohio, and the Little Kanawha railroads, and on the Ohio River, which is crossed here by a railroad bridge, over 1 mile in length. Its industries include lumber mills, barrel factories, machine shops iron foundries, furniture factories and an oil refinery. It has several private educational institutions and a U. S. government building. Pop. 1920, 20,050.

PARKES, SIR HARRY SMITH (1828-85), Brit. diplomatist; consul to China, 1856; one of three commissioners placed in control of Chin. government, 1858 ;imprisoned (at Peking, 1860; consul at Shanghai; minister to Japan, 1865-82; supported westernising party; minister to China, 1882-85.

PARKHURST, CHARLES HENRY (1842), a clergyman, *b.* at Framington, Wass., *s.* of Charles F. W. and Mary Goodale Parkhurst. After graduating from Amherst in 1866, he was principal of Amherst High School for 2 years and then studied theology at Halle, and later at Leipzig. He was ordained a Presbyterian minister in 1872 and was pastor of the Congrgational Church, Lenox, Mass. 1874-80, after which he was pastor of the Madison Square Presbyn. Church, New York until 1918. Author: *A Little Lower than the Angels,* 1900, and others.

PARKMAN, FRANCIS (1823-1893), American historian, *B.* in Boston, Sept. 16, 1823; *d.* in Jamaica Plains, Mass., Nov. 8, 1893. Graduating from Harvard in 1844, he studied law two years at the Harvard Law School but never practiced. Always interested in American history he decided on writing the story of the rise and fall of French power in America. To qualify himself for the undertaking he visited the scenes of French and English conflicts and sought out the descendants of the Indians who had participated. In 1842 he visited Italy for his health and some time in a monastery. To improve his knowledge of the Indians he joined a tribe of Dakotas, enduring many hardships in travelling around with them. His experiences are embodied in the work *California, and the Oregon Trail.* Broken in health by his western adventures he never quite recovered. The first volume of *The Conspiracy of Pontiac* appeared in 1851, the second volume in 1865. The period between these two productions was spent in looking up historical material and in writing a novel, *Vassall*

Morton, which was not a success. Poor health forced him to take up horticulture which resulted in *The Book of Roses*, 1871. In the following year he was professor of horticulture at Bussey Institution. (harvard University). His other works are *Pioneers of France in the New World*, 1865; *Jesuits in North America*, 1867; *La Salle and Discovery of the Great West*, 1869; *The Old Regime in Canada*, 1874; *Count Frontenac and New France under Louis XIV.*, 1877; *Montcalm and Wolfe*, 1884; *A Half-Century of Conflict*, 1892, completing the series. He possessed a deep knowledge of Indian life and character and made seven journeys to Europe to find material for his works.

PARKS, LEIGHTON (1852), an American clergyman, *b.* at New York, *s.* of Rev. Martin Phillips and Georgiana Clough Mabry Parks. He was educated at the General Theological Seminary. He became a deacon in 1876 and the following year a priest in the Protestant Episcopal Church. He was rector of Emanuel Church, Boston, Mass., from 1878 until 1904, after which he was rector of St. Bartholomew's Church, New York. In addition to writing numerous sermons and addresses he was the author of: *His Star in the East*, *The Winning of the Soul and Other Sermons* 1893, and *Moral Leadership*, 1914.

PARKS, NATIONAL. See NATIONAL PARKS.

PARKS, NATIONAL MILITARY, areas acquired and developed by the Government under authority of acts of Congress to preserve notable battlefields of the Civil War as memorials and for historic purposes. There are five of these which are under the general supervision of the Secretary of War and are managed by commissions appointed by him. Chickamauga and Chattanooga Military Park in Tennessee and Georgia including Missionary Ridge, Lookont Mountain and the fields on which the battle of Chickamauga and Chattanooga were fought in Sept. and Nov. 1863, have an area of 6,966 acres. It was established by act of Congress Aug. 19, 1890. Shiloh National Military Park in Tennessee, covering the ground on which the battle of Shiloh was fought in 1862, has an area of 3,564 acres and was established Dec. 27, 1894. In the following year, Congress created the Gettysburg National Military Park, including the ground on which the famous battle was fought in 1863 and covering 24,460 acres. Vicksburg National Military Park in Mississippi was established in 1899, includes the positions occupied by the Union and Confederate troops during the siege in 1863 and covers 1,353 acres. Part of the battlefield of Antietam, Md., commemorating the battle in 1862, is also under the control of the Government. Other parks that differ in character from (those before named, but are also placed under the jurisdiction to the Secretary of War, are those of Lincoln's birthplace in Kentucky and at Guilford Court Houes, N.C.

PARLA KIMEDI (18° 47′ N., 84° 8′ E.), town, Ganjam, Madras, India. Pop. 18 000.

PARLEMENT (Fr. *parler*, to speak), Fr. court of justice abolished, 1790; name never applied in Fr. history to entire national gathering, but used in early times for privy council, *curia regis*, of which functions were primarily judicial; at first followed king, but was established in Paris by Philip IV. 1285-1314; composed of *chambre des requetes*, *chambre des enquetes*, and *grande chambre*, relic of older gathering, in which peers had right of sitting. Similar p's arose in provinces and often withstood tyranny of king, retaining right of registering national law before it came into force locally, and of 'remonstrance' if law infringed on local liberties.

PARLIAMENT (Fr. *parler*, to speak'), supreme legislative authority of U.K. Its legislative power is not subject to constitutional or statutory limitation, but Parliament cannot legislate in such a way as to bind its successors. Control of Parliament over executive derived from fact that ministers of crown, who form the heads of the administrative departments, are chosen from party or parties enjoying a majority in House of Commons and are themselves members of one of the Houses of Parliament. This control strengthened by the fact that departments are subject to laws made by Parliament, and that money required to meet their expenditure has to be voted annually by House of Commons and embodied in statute.

By time of Henry IV. House of Commons wasassuming the more important position in regard to taxation and supply, and was asserting the claim toi nclude the Lords in the taxes levied upon subjects of the crown. Attempts of Tudor sovereigns to acquire money by forced loans and benevolences, and of Stewart kings by imposition of duties and votes by virtue of royal prerogative, were sternly resisted, and right of Parliament alone to levy charges on the subject was reasserted by Petition of Right, 1629 and Bill of Rights, 1689. Right of Commons to take part in legislation received statu-

tory recognition in 1322, but not till reign of Henry V. did bills receive royal assent in form agreed to by Parliament; modern system may be said to date from Henry VI. Various dates have been assigned for formal separation of Lords and Commons, but there is little doubt that it took place not later than 1341. The Commons sat in the 'Painted Chamber' in 1343, and the Lords in the Chambre Blanche; Commons moved to St. Stephen's Chapel in 1574. First Speaker was Sir Thomas Hungerford in 1376.

A statute of 1331 enacted that Parliament should be holden every year once, and more often if need be, and thirty-two years later this was reaffirmed. Though the statute was constantly disregarded, annual sittings became the rule from the latter years of Edward I. until beginning of Henry VIII.'s reign. During this period of 213 years, 200 Parliaments were convened, the sittings lasting from four days to several months. Under Henry VIII. and Elizabeth Parliaments were short and held irregularly for purposes of taxation, but in latter reign Commons boldly claimed to discuss affairs of Church and State. The differences between the Stewarts and their Parliaments led to their less frequent assembly—a period of eleven years 1629-40 actually elapsing between the calling of two Parliaments by Charles I. The Triennial Act, 1694, enacted that Parliaments should be holden once in three years at least, and this is the law at the present time; but the financial arrangements of the country and the annual voting of supplies necessitates a meeting of Parliament every year.

Prior to Triennial Act duration of Parliament not limited by statute. Septennial Act 1715 provided that Parliament should cease to exist in seven years from date of first meeting, and this period was reduced by Parliament Act 1911 to five years. Parliament which met on Jan. 31, 1911, extended its own life to period of six years and three months in consequence of the World War.

Parliament of U.K. consists of sovereign and three estates of the realm. Lord Spiritual and Temporal sit together and form House of Lords, while elected representatives of the third estate of the realm constitute House of Commons. In 1847 it was provided that the number of bishops entitled to sit in House of Lords should not be increased. Irish and Welsh bishops lost their seats at the disestablishment of the Irish and Welsh Churches respectively. Archbishops of Canterbury and York, Bishops of London, Durdam, Winchester, and twenty others are entitled to sit in Lords. Lords Temporal are the dukes, marquesses, earls, viscounts, and barons. Sixteen peers of Scotland elected for each Parliament, and twenty-eight representative peers of Ireland, elected for life, also sit. In addition to hereditary and representative peers, there are Lords of Appeal in Ordinary (created under Judicature Acts 1876) who sit as life peers. Original number of four extended to six in 1913.

Number of members of House of Commons has increased from about 250 in Edward II.'s reign to 658 in 1832, 670 in 1885, and by the Representation of the People Act, 1918, to 707. England and Waies now return 254 members in single-member constituencies for 58 parliamentary counties; 266 members in 255 divisions for 137 parliamentary boroughs; and 8 members for 12 universities (5 university constituencies)—making a total of 528.

Since 1911 members have been paid an annual salary of $2,000 from public funds. Minors, aliens (unless naturalized), persons attainted or adjudged guilty of treason and felony (unless sentence has been served or pardon received) or persons adjudged bankrupt (except in Ireland) are disqualified for membership, as are judges clergy, government contractors, and holders of various offices under the crown. Peers of England and Scotland (but not Irish peers, except representative peers) are incapable of serving in the House of Commons.

Parliament is summoned by king's writ or letter issued out of the chancery, and may be directed to meet at any time not less than thirty-five days from the date of proclamation. A Parliament so summoned may be prorogued by proclamation to a date not less than fourteen days from the proclamation. In event of demise of crown, Parliament, if prorogued or adjourned, meets at once without summons. If demise takes place after dissolution and before date fixed by writ for meeting of new Parliament, last preceding Parliament meets and sits for six months. Otherwise, new Parliament meets at once.

Parliament is prorogued by the king's command signified in Parliament at close of each session, and at ther times by proclamation. Prorogation puts an end to any business pending in Parliament, except an impeachment or appeals pending before House of Lords. It is dissolved by royal proclamation, usually after being prorogued to a certain day.

House of Lords is highest court of appeal from courts of law and its hearing of such appeals continues during prorogation os dissolution. It has jurisdiction in trial of peers for treason and felony, and constitutes court before which persons impeached by Commons

are tried. Under reference from crown it also decides claims to peerages.

PARLOW, KATHLEEN (1890), Violinist; *b.* at Calgary, Alberta, Canada. At the age of six years made first appearance on stage in San Francisco. In 1905 went to Europe and played with the London Symphony Orchestra and before Queen Alexandra. Toured in Holland, British Isles, Germany and Scandinavia with orchestras, The seasons of 1911-12 appeared with the Boston Symphony Orchestra.

PARMA (44° 48′ N.; 10° 19′ E.) town, on Parma, northern Italy; capital of province P., with cathedral (began 1059) Baptistery (XII. cent.) San Giovanni Evangelista (with frescoes by Correggio), Madonna della Steccata, Palazzo della Pilota (containing fine picture-gallery with works by Corregio, Tintoretto, Tiepolo, and others), Palazzo Municipale, univ. 1512. P. flourished under Romans, and rose to great importance during Middle Ages; home of Correggio. P. was once famed for woolien manufactures; chief industries silks, iron-ware, pianos, tobacco. Pop. 55,000.

PARMELEE, HOWARD COON (1874), an American editor, *b.* at Omada, Neb., *s.* of Edward Anson and Sarah Knox Coon Parmelee. He was educated at the University of Nebraska. After being asst. chemist of the U.P.R.R. Omaha and chief chemist of the Globe Plant of the American Smelting and Refining Co., Denver, Colo., he engaged in a consulting practice in Denver from 1902-3 and then for one year was editor of the Mining Reporter of that city, after which he was editor of the Western Chemist and Metallurgist, until 1910, western editor of the Metallurgical and Chemical Engineering, 1910-16, president of the Colorado School of Mines, 1916-17 and then acting editor and after 1919 editor of Metal and Chemical Engineering New York.

PARMENTER, GEORGE FREEMAN (1877), an American chemist, *b.* at Dover, Mass., *s.* of Freeman Artimus and Lucy Goulding Parmenter. He was educated at Massachusetts Agricultural College and at Brown University. After being an instructor in chemistry at the former instituton in 1900 and the following year assistant chemist of the R. I. Experimental Station, he became an instructor in chemistry at Brown University and after 1904 was professor of same and the head of that department. Author *Laboratory Experiments for Colby College.*

PARMESAN CHEESE. See CHEESE.

PARMIGIANO (1504-40), celebrated painter of Lombard school, whose real name was Girolama Francesco Maria Mazzola. He worked at first in Rome, where he painted *The Vision of St. Jerome*, now in National Galiery, London; then in Bologna, where he executed a notable altarpiece, *The Modanna and Child*; and finally in his native Parma. *Cupid shaping a Bow* is his best-known picture.

PARNAHYBA (2° 58′ S.; 41° 38′ W.), seaport, on Parnahyba, Piauhy, Brazil; exports hides. Pop. 10,500.

PARNASSUS, modern Liakoura (38° 31′ N. 28° 37′ E.), mountain-ridge, Greece; sacred to Apollo and the Muses.

PARNASSUS PLAYS, three entertainments performed at St. John's Coll., Cambridge, between 1597 and 1603. The plays record the adventures of two students, Philomusus and Studioso, and reveal satirically the small respect paid to learning at the time. Their chief value lies in their allusions to Shakespeare and his contemporaries.

PARNELL, CHARLES STEWART (1846-91), Irish politician; *s.* of John Henry Parnell of Avondale co., Wicklow; educated at Magdelene College, Cambridge; M.P. for co. Meath 1875-80; at once commenced policy of opposition to England; in first speech in Parliament advocated Home Rule and Irish nationality; joined Amnesty Association, for release of Fenians, 1876; in 1877 developed Irish plan of parliamentary obstruction, causing record sitting of Parliament (July 21 to August 1); sought to win over Fenians and establish united Irish party, this union was largely brought about by agrarian distress; 'Ireland for the Irish' became general gospel of revolutionists; National Land League was founded 1879, of which Parnell beeame president. He visited America to win support of Amer. Fenians, and obtain funds for League, 1880; represented Cork, 1880-91; chairman of Nationalists in House of Commons 1880; founded *The Irish National Newspaper and Publishing Company*, and reissued *The Flag of Ireland* as *United Ireland*, 1881; imprisoned, 1881-82 at Kilmainham for speeches at League Convention in Dublin; refounded Land Leagues as *Irish National League*, 1883; Fenianism continued, and revolutionary crimes were repeated; attempts to blow up Tower of London and Houses of Parliament, 1885. Parnell was bitterly attacked, but refused responsibility, and continued policy of obstruction; chairman of Irish Parliamentary party, 1886, when Gladstone declared for Home Rule; the Bill of 1886 failed, but resulted in

alliance of Irish Nationalists with Liberal party; Parnell had to face, in 1887, charge of having sympathized with Phoenix Park murders; a forged letter, by Richard Pigott, was pub. in *Times* under heading 'Parnellism and Crime.' In 1891 he married Mrs. O'Shea, divorced from Captain O'Shea, 1890. The Irish Parliamentary party re-elected him chairman, but Gladstone's letter to Morley, stating that he must resign, altered matters.

PARNELL, THOMAS (1679-1718), Eng. minor poet. Goldsmith wrote his life, and Pope published a selection of his poems in 1719.

PARNON, modern Malevou (37° 10′ N., 22° 38′ E.), mountain-ridge, Greece, E. of Laconia.

PAROCHIAL SCHOOLS, educational institutions attached to Roman Catholic parishes and controlled by the Roman Catholic Church authorities, in which both secular and religious instruction are imparted to the pupils. They receive no State aid and are supported by the voluntary contributions of members of the Roman Catholic faith. In the main they correspond in scope, method and organization with the public schools maintained by the civil authorities. The teachers are drawn from the various religious orders of the church, though lay assistants are some times employed. The position of the church on education, promulgated by Pope Benedict XV in 1917, is thus indicated:

"Catholic children must not attend non-Catholic, undenominational or mixed schools, those namely that are also open to non-Catholics. It belongs exclusively to the Bishop of the locality to judge under what circumstances and with what precautions against the danger of perversion attendance at these schools may be tolerated."

In conformity with this decree, parochial schools are to be found in every section of the country where the Roman Catholic congregations are strong enough to support them. The cost of their upkeep is estimated at about $12,000 000 a year. Attempts have been made at various times in different States to have parts of the general public school fund apportioned to parochial schools, bnt these have not proved successful. The number of pupils in parochial schools in the United States, as given in the Official Catholic Directory of 1922, was 1,852,498.

PARODY, imitation, generally humorous, of another's writing; famous Eng. p's include works of Horace and James Smith, Hookham Frere, Calverley, Owen Seaman. See also BURLESQUE.

PAROPAMISUS (34° 40′ N., 67° E.) mountain range, W. of Hindu-Kush India.

PAROLE (Fr. from late Lat. *paraula*) and English word formerly in use as the equivalent of verbal or oral, but is now employed only in the legal phrase *parol evidence* as distinguished from written evidence, etc. In its more common sense it is an abbreviation of the French phrase *parole d'honneur*, or word of honor. This is a military term, meaning an engagement given by a prisoner of war that, if released, he will not again take up arms in the war in which he has been engaged. P. is also used as an equivalent for password or watchword.

PAROS, PARO (37° 2′ N. 25° 11′ E.), Gk. island, in Cyclades (*q.v.* group, Ægean Sea; separated from Naxos by narrow channel; length, 13 miles; breadth, 10 miles; area, 96 sq miles; dominated by Mount Elias 2500 ft. (ancient Marpessus); capital Parikia, on N.W. coast; Naoussa Bay (safe harbor) on N.; famous white Parian marble quarries worked from VI. cent B.C. onwards. Pop. 9,000.

PAROTID GLAND, one the salivary glands. It is situated in front of and below the external ear; its duct (*Stensen's duct*) is about two inches long and opens on the buccal surface of the cheek opposite the second upper molar cheek. The gland secretes saliva containing ptyalin, potassium, sulphocyanide, traces of urea, mineral salts, etc.

PARQUETRY (Fr. *parqueterie*, from *parquet*, flooring), the name given to inlaid wood-work in which the different kinds of wood form the pattern. Such patterns are entirely geometrical and angular in design, and when well executed with good wood form beautiful floors, for which P. is generally used. The boards may be solid throughout, or have only a veneer of more expensive wood, and are generally grooved and tongued for joining together.

PARR, CATHERINE. See HENRY VIII.

PARR, SAMUEL (1747-1825), Eng. schoolmaster; pub. an edition of Bellenden, with a celebrated preface; his works issued in 1828, filled eight huge volumes.

PARR, THOMAS (*c.* 1483-1635) 'Old Parr,' was a native of Alberbury near Shrewsbury. He is said to have lived to the age of 152, and his longevity has been celebrated by Taylor, the 'water-poet.'

PARRISH, CLARA WEAVER, Artist *b.* at Selma, Ala. Studied art in New

York and Paris. Has exhibited at London, Paris and America, Awarded water-color prize, Woman's Art Club, 1902. Watrous figure prize, 1913; silver medal Appalachian Exposition, 1911; Silver medal, Panama Philippine Islands Exposition, 1915; Saltus prize, 1916. Member of various clubs and societies.

PARRISH, MAXFIELD (1870), an American artist *b.* at Philadelphia, *s.* of Stephen and Elizabeth Bancroft Parrish. He was a student at Haverford College for 3 years and then studied art at the Pennsylvania Academy of Fine Arts and under Howard Pyle. He received honorable mention at the Paris Exposition in 1900, silver medal Buffalo exposition, 1901 and gold medal from the Architectual League New York in 1917.

PARRISH, RANDALL (1858), an American author, *b.* in Henry county, Ill., *s.* of Rufus P. and Frances A. Hollis Parrish. He was educated at the University of Iowa. He was admitted to the Iowa bar and practiced at Wichita, Kansas, from 1879-83, then after prospecting for two years in Arizona and New Mexico, he engaged in newspaper work and was connected with various newspapers in the western United States and later in special commercial journalism in Chicago. Author: *When Wilderness Was King*, 1904; *Historic Illinois*, 1905; *Prisoners of Chance* 1908; *The Strange Case of Cavendish*, 1919; *Mystery of thr Silver Dagger*, 1920 and *The Gift of the Desert*, 1921.

PARROT-FISHES (*Scaridoe*), Wrasse-like fishes with teeth fused into a kind of beak, whence the name; mostly tropical.

PARROT TRIBE (order Psittaciformes) an order of brilliantly colored birds, containing almost 600 species, with large, strongly curved beak, fleshy tongue, and feet in which the first and fourth toes turn backwards, the second and third forwards. They are arboreal, feed mainly on fruits and seeds, live in companies, but pair in couples. The Nestor Parrots (*Nestor*), found only in New Zealand and neighboring islands, include the Kea, which has gained an unenviable reputation on account of its habit of tearing open the backs of sheep in order to gorge upon the kidneys. The Lories and Loriquets (*Loriidoe*) have brush-tipped tongues, and are confined to Australia and islands near it. In Cockatoos (*Cocatuidoe*) the tongue is simple, and the head is crowned by a crest of feathers; whereas the True Parrots have a smooth tongue, have no crest, and often have a metallic green coloring in their plumage. True Parrots, of which there are about 440 species, are found in both Old and New Worlds. Familiar examples are the Grass Parakeet of Australia (*Melopsittacus*); the Grey Parrot of Africa (*Psittacus erithacus*) the most imitative, and best talker; the beautiful nimble Amer. Love-Birds or Parakeets (*Psittacula*); the most showy of Parrots, the large, long-tailed Macaws (*Ara* and *Anodorhynchus*) of South Amer. forests, brilliant in coats of scariet, blue green, and yellow; and the peculiar winged, but flightless, nocturnal Owl Parrot (*Stringops*) of New Zealand.

PARROTT, ROBERT PARKER (1804-77), ordnance inventor and artillery officer; *b.* Lee, N. H. He was an ordnance instructor at West Point Military Academy after graduating in 1824, and fought against the Creek Indians. In 1836, as a captain of ordnance he entered civil life as head of an iron and gun foundry at Cold Spring, N. Y., and invented the Parrot cannon used by the federals in the Civil War. Later he served as a judge in Putnam County and as school superintendent at Philipstown.

PARRY, SIR WILLIAM EDWARD (1790-1855), Eng. explorer, admiral, and author; commanded *Alexander* in Capt. Ross's Arctic expedition, 1818; led famous expedition by which direction of North-West Passage was discovered, 1819.

PARSEES, a people originally in Persia, occupying the province of Farsitan (Farsees = Parsees = Persians), *c.* 558 B.C. Their religion was Zoroastrian and dualistic. Ormuzd, the 'Lord Wisdom,' the god of the sky, whose symbol is the sun, or fire, or light, is the creator, and against him Ahriman, the prince of darkness, wages war.

PARSIMONY, LAW OF, nominalist maxim that it is bad scientific method to attempt to explain the same facts by independent hypotheses.

PARSLEY (*Petroselinum*), genus of plants, order Umbelliferae; Common P. (*P. sativum*) is a familiar garden plant; seeds are sown in April.

PARSNIP (*Pastinaca*), genus of plants, order Umbelliferae; Common P. (*P. sativa*) is cultivated for its roots which must not be cut before cooking; root of wild P. is not edible.

PARSONS, a city of Kansas, in Labette co. It is on the Missouri, Kansas and Texas, and the St. Louis and San Francisco railroads. Its industries include flour mills, grain elevators, chicken-feed factories, clothing factories,

etc. It is the seat of the State Hospital for Epileptics and has a high school, Federal building, Masonic Temple, etc. Pop. 1920, 16,028.

PARSONS, ALBERT ROSS (1847), Musician, Archaeologist and Genealogist; *b.* at Sandusky, Ohio. Educated privately in New York and Buffalo. Studied music at Royal Conservatory in Leipzig. Specialized in technics, musical pedagogy and was prominent in archaeology. Composer of songs and pianoforte pieces. Designer of the symbolic pyramid mausoleum at Greenwood Cemetery, New York. Dante lecturer and readings, Bacon and Shakespeare, Author of *Wagner's Beethoven*, 1870; *Science of Pianoforte Practise*; Parsifal, or the finding of Christ Through Art. New Light from the Great Pyramid. Cornet Joseph Parsons. A.D. 1636-1655, 1901. Garrard-Spender Family Chart A.D. 1000-1876, 1877. The Road Map of the Stars, 1911; Surf Lines by Wayfarer, 1913; The Virtuoso Handling of the Piano, Advanced Exercises; 1917; an Evening Prayer (poem), 1917.

PARSONS, ALFRED WILLIAM (1847-1920), Eng. painter, chiefly in water-color; his picture, *When Nature painted all Things Gay*, 1887, was purchased by Chantrey Bequest; also did work in illustration (with E. A. Abbey, R.A.) of Herrick's *Poems*, *She Stoops to Conquer*, and *Old Songs*; (with F. D. Millet) *The Danube from the Black Forest to the Black Sea*; and alone, of Wordsworth's *Sonnets* and *The Warwickshire Avon*.

PARSONS, FRANK ALVAH (1868), an American lecturer on art, *b.* at Chesterfield, Mass., *s.* of Alvah and Sarah Sanderson Parsons. After being educated at Wesleyan Seminary, he studied art abroad and later graduated from the department of Fine Arts, Teachers College, Columbia University. After lecturing in Boston and vicinity for 8 years, he was an instructor at Columbia University from 1899-1905, and president and director of New York School of Fine and Applied Arts from 1905 until 1914, after which he was professor of advertising display at New York University. He yearly delivered a course of lectures at the Metropolitan Museum of Art and conducted a summer study class in Europe. Author: *The Psychology of Dress*, 1920 and others.

PARSONS, HERBERT (1869), ex-congressman, *b.* at New York, *s.* of John Edward and Mary Dumesnil McIlvaine Parsons. He was educated at Yale and at the University of Berlin. After studying law at the Harvard Law School and at the Metropolis Law School he was admitted to the bar in 1895 and became the senior member of the firm of Parsons, Closson and McIlvaine. He was alderman of New York from 1900-3, and a member of the 59th to 61st Congress, 1905-11, 13th New York District. Lt. col. on General Staff A. E. F., Sept. 1918, and served during the last half of 1918 as assistant chief of staff G2, 5th Div.

PARSONS, FATHER ROBERT (1546-1610), Eng. Jesuit; entered Society of Jesus 1575, and became a priest, 1578; rector of Eng. Coll. at Rome; wrote *Conference about the next Succession*, 1594.

PARSONS, THEOPHILUS (1750-1813), jurist; *b.* Byfield, Mass. Graduating from Harvard in 1769, he taught school, then studied law, and in 1774 opened a practice at Falmouth, but the destruction of that town by the British in the revolutionary war destroyed his professional prospects there. He settled at Newburyport after the war and became a leading antagonist against the adoption of the new constitution of Massachusetts. He strongly supported the federal constitution and in 1788 was a member of the State convention called to ratify it. For seven years before his death he was Chief Justice of the State Supreme Court. His *s.*, Theophilus Parker, 1797-1882, Dane professor of law of Harvard, 1874-1872, published a biography of him in 1859.

PARSONS, THOMAS WILLIAM (1819-1892), translator of Dante, poet and dentist; *b.* Boston. As a resident of Italy, where he went in 1836, he translated, 1843, the first ten cantos of Dante's *Inferno*, completing the *Divina Commedia* in 1867, and then translated most of the *Purgatoria*. He wrote several volumes of poetry and figures as the Poet of Longfellow's *Tales of a Wayside Inn*. In his later life he practised as a dentist in London and Boston.

PARSONS, SIR WILLIAM (*c.* 1570-1650), 1st baronet, 1620; nephew of Sir Geoffrey Fenton, whom he succ. as surveyor-general of Ireland, 1602; aided policy of colonisation; Lord Justice, 1640-48.

PARSONS, WILLIAM BARCLAY (1859), American civil engineer; *b.* New York City. He graduated at Columbia University in 1879 and three years later from the Columbia School of Mines. For several years he was connected with tde Erie Railroad, but soon resigned to enter upon general practice as a consulting engineer. He was chief engineer of the Rapid Transit Commission of New York in 1894, a member of the Isthmian

Canal Commission, 1904, and of the board of consulting engineers of the Panama Canal, 1905. Much of his work has been done in China and other foreign countries in connection with railroad construction. He commanded the 11th U. S. Engineers in France during the World War. He has written extensively for technical magazines and contributed scientific articles to encyclopedias. His publications include *Turnouts*, 1885; *An American Engineer in China*, 1900 and *The American Engineers in France*, 1920.

PARTABGARH (15° 34′ N., 81° 59′ E.), native state, Rajputana, India. Pop. 1911, 62,704. Capital, Partabgarh. Pop. 10,000.

PARTHENOGENSIS. See Biology.

PARTHENON, temple on Athenian Acropolis dedicated to Athena; dates from V. cent. B.C. (supplanting earlier temple); it became later a Christian church, then a mosque; famous for its sculptures, some of which were removed to England, 1821, among Elgin marbles.

PARTHIA, mountainous country S. E. of Caspian Sea; part of Realm of Seleucidae existing roughly between 250 B.C. and 220 A.D.; inhabited by an Iranian tribe; was a province of the Achaemenian and later Macedonian Empire; Gk, towns founded by Seleucus I. and Antiochus I.; capital Hecatompylos (Hundred-gated). P. corresponds to modern Khorasan. Favorite tactics of Parthians was to retreat and fire arrows in so doing—hence, a *Parthian shot* or *shaft.*

PARTICK (55° 53′ N., 4° 19′ W.), town, on Clyde, Lanarkshire, Scotland; shipbuilding yards; incorporated with Glasgow City, 1912. Pop. 65 000.

PARTICIPLE (from *particeps*, sharing, partaking), in grammar a word that 'partakes' of the nature of both a verb and an adjective. It is a derivative of a verb, and can govern an object and imply the relation of time (I am *hiding* the thimble), or be used attributively like an adjective, merely qualifying a noun (the *hidden* thimble). There are two simple participles—present and past. They are verbal adjectives, not nouns.

PARTINICO (38° 2′ N., 13° 7′ E.), town Sicily; cotton and wool manufactures. Pop. 24,000.

PARTITION, division of land by its co-owners by authority of Court of Chancery. Recompense in the form of pecuniary compensation must be made in the case where one party to the partition has laid out money on improvements of the estate, or where houses, forming part of the estate, cannot be divided.

PARTNERSHIP is defined as 'the relation which subsists between persons carrying on a business in common with a view to profit.' Each of the partners must be competent to contract, and, therefore, if an infant enters into a contract of partnership, he is not responsible for the debts of the firm, and he may repudiate the partnership before or when he comes of age. Apart from agreement, the death or bankruptcy of a partner puts an end to the partnership. The court may dissolve a partnership where a partner is found to be a lunatic, and for other reasons. A private partnership cannot be formed of more than ten persons for banking, or twenty for any other business. If that number is exceeded, such persons can only carry on business together legally when registered as a company. A partnership may be at will, or it may be for a definite period. No person may be introduced as a partner without the consent of all the existing partners. A *dormant* or *sleeping partner* is one who participates in the profits without taking any active share in the management, and without appearing before the world as a partner. Such a partner is, however, like any others, responsible for the debts of the firm. Every partner is an agent of the firm and of his other partners for the purpose of the business of the partnership, and his acts bind the firm and his partners, if they are performed within the usual course of the firm's business. Every partner is liable jointly with his copartners.

PARTON, JAMES (1822-91), American author; *b.* Canterbury, England. He was brought to the United States when five years old, received a common school education and adopted the profession of journalism, his first employment being on the staff of the Home Journal of New York. The great success that attended his life of Horace Greeley in 1855 and the Life of Aaron Burr that followed led him to abandon journalism for literature. He removed from New York to Newburyport, Mass., in 1875. He was a virile and prolific writer and speedily became one of the leading literary figures of America. Most of his works were biographical or historical. His publications include *Life of Andrew Jackson*, 1859-60; *General Butler in New Orleans*, 1863; *Famous Americans of Recent Times*, 1870; *Life of Thomas Jefferson*, 1874; *Life of Voltaire*, 1881; *Noted Women of Europe and America*, 1883 and *Captains of Industry*, 1884.

PARTRIDGE. See under Pheasant Family.

PARTRIDGE, BERNARD (1861), Eng. black-and-white artist; stained-glass designer and decorative painter, 1880-4; joined staff of *Punch*, 1891; leading cartoonist since retirement of Tenniel; paints occasionally in oil, water, and pastel; as actor has appeared in *New Lamps for Old, Arms and the Man, Under the Red Robe*, etc.

PARTRIDGE BERRY, the red, edible fruit of two distinct N. American plants, *Mitchella repens* and *Gaultheria procumbens*. The former bears fragrant white flowers, and is sometimes grown on rockeries; the other prefers a moist, peaty soil; from its root a volatile oil, used in scenting soaps, is distilled.

PARTRIDGE, SIDNEY CATLIN (1857), Bishop. *B.* at New York. In 1880 graduated from Yale College and in 1884 from Berkeley Divinity School. As missionary went to Shanghai and taught at St. John's College and was chaplain of St. Mary's Hall, Shanghai, from 1884-1887. In 1887-1899 rector of Boone School and missionary at Wu-Chang, China. In 1900 consecrated missionary bishop of Kyoto, Japan, and elected bishop of Diocese of West Missouri, 1911.

PARTRIDGE, WILLIAM ORDWAY (1861), American sculptor and author; *b.* Paris, France. He studied at Columbia University and later pursued art studies at Florence, Rome and Paris. He has created many notable works of sculpture, among which may be cited statues of Alexander Hamilton, General Grant, Shakespeare and a bust of Edward Everett Hale, as well as the group Christ and St. John in the Brooklyn Museum of Fine Arts. His publications include *Art for America*; *The Long Life of a Sculptor*; *The Angel of Clay*; *Nathan Hale, the Ideal Patriot*, and *The Czar's Gift*, a novel, 1906.

PARTY-WALL, in building, a wall between two adjoining houses to separate them from each other. For the better prevention of the spread of fire the building bylaws provide that Ps. shall in the case of buildings exceeding thirty feet in height, be nine inches in thickness and carried up at least twelve inches above such part of any roof as is opposite to and within four feet from the P. The P. must be continued up through and above the roof so as to form a parapet of a certain height, varying according to the particular class of building; the object being to prevent flames from a burning house blowing over and cracking the slates of an adjoining house, and so burning the exposed timbers.

PASADENA, a city of California, in Los Angeles co. It is on the Southern Pacific, the Atchison, Topeka and Santa Fe, and Salt Lake railroads, 9 miles N.E. of Los Angeles. The city is at the foot of the Sierra Madre mountains and has a superb climate, which with its beautiful surroundings, have made it a favorite summer resort. It is also the center of an extensive fruit growing region. It has flour mills, packing plants, canneries, and other industries. There is a Polytechnic Institute, public library and several private schools. Pop. 1920, 45,334.

PASARGADÆ (30° 16′ N., 53° 26′ E.) former capital of Persia, said to have been founded by Cyrus after his defeat of Astayages; has been identified with ruins in plain of Murghab, near Persepolis.

PASCAGOULA, a riv., in the southeastern portion of Mississippi. It flows for a course of about 250 m. into a small bay of the same name, on the Gulf of Mexico, and is navigable for about 100 miles.

PASCAL, BLAISE (1623-62), Fr. religious philosopher; *b.* at Clermont Ferrand; embraced doctrines of Jansenits; wrote in their defence against the Jesuits the famous *Lettres Provinciales* 1656-57, supposed to be written by a man of the provinces to a Jesuit. First three letters defend Jansenists, rest attack Jesuits; novelty and literary merit is that they were in French, so that public—'even women'—might take part in controversy; they are in turn vehement, jovial, indignant and disdainful. He wished to write an apology for Christian religion which would persuade the reader of its truth, and result was fragments which were collected as *Pensees*, another Fr. classic.

PASCHAL I., pope, 817-24; crowned Emperor Lothair, with whom he made *Pactum Ludovicianum* (genuine but interpolated), 823; took part in iconoclastic controversy, vigorously upholding worship of relics.—Paschal II., pope, 1099-1118; importance of his pontificate lies in continuation of investitnre conflict, P. declining to give way.

PASCO, CERRO, DE. See CERRO DE PASCO.

PAS-DE-CALAIS, mar. dep., N. France (50° 35′ N., 2° 10′ E.), formed out of Artois and Picardy; surface generally flat; very fertile; extensive coalfields and iron mines; large agricultural products; live stock, poultry, and fishing; sugar refining, distilling; glass, paper, pottery, leather manufactures.

Cap. Arras. Area, 2,551 sq. m.; pop. 1921, 989,867.

In World War the dep. suffered severely. Arras was reduced to rnins; Lens and its coal mines were destroyed; and large tracts of rich agricultural country in the S.E. were laid waste. On its territory were fought the battles of Loos 1915, part of the Somme struggle, 1916-17; Arras, 1917; and the advance to the Hindenburg Line, 1917-18.

PASEWALK (53° 30′ N., 13° 59′ E.), town, Pomerania, Prussia; ironworks. Pop. 11,000.

PASHA, PACHA, or **BASHAW,** a title derived from the Persian, and applied to commanders of high rank, naval, military, or civil, in the Turkish empire. At one time it was limited to princes of the blood. Every general or governor of a prov. is *ex officio* a P.

PASIG (14° 30′ N., 121° E.), town, Luzon, Philippine Islands. Pop. 13,000.

PASLEY, SIR CHARLES WILLIAM (1780-1861), Brit. general, 1860, and engineer; served in Baltic campaign, 1801, and Peninsular War; author of books on art of war, and inventor of engineering reforms.

PASQUIER, ÉTIENNE DENIS, DUKE (1767-1862), Fr. lawyer and statesman; imprisoned as Moderate, 1794, but speedily released on close of Terror; won regard of Napoleon, and was able statesman under empire and restored monarchy.

PASSAGLIA, CARLO (1812-87), Ital. ecclesiastic, supported doctrine of Immaculate Conception of Virgin, but wrote against temporal power of pope; excommunicated; recanted before his death.

PASSAIC, a city of New Jersey, in Passaic co. It is on the New York, Susquehanna and Western, the Lackawanna and Erie railroads, and on the Passaic river. It is an important manufacturing city and has print mills, woolen mills, shoddy mills, tanneries, etc. It has a public library and a hospital. Pop. 1920, 63,834.

PASSAMAQUODDY BAY, an inlet of the Bay of Fundy, 12 miles long and 8 miles wide at the entrance, and forming part of the boundary between Maine and New Brunswick. The St. Croix River empties into the bay which is deep and offers many safe and capacious harbors. The principal town in its vicinity is Eastport, which is located on one of the islands at the mouth. The fisheries are important; in fact the word Passamaquoddy means in the Indian tongue 'the place where there is plenty of pollock.'

PASSAU (48° 34′ N., 13° 28′ W.), town, Bavaria, Germany; has large trade in timber, graphite, iron, grain, salt; seat of bishopric; has XVII.-cent. cathedral. Treaty of P. 1552, ensured religious liberty. Pop. 22,000.

PASSCHENDAELE, vil., W. Flanders, Belgium (50° 55′ N., 2° 54′ E.), 7½ m. N.E. of Ypres, on crest of slight straggling ridge some 200 ft. above sea-level, and extending from wooded heights near Gheluvelt on S. to Forest of Houthulst on N., last elevation before dead level of Flanders plain is reached. Was a valuable coign of observation over Ypres salient. Captured by Germans during first battle of Ypres (Oct. 1914), and held for nearly three years; strongly fortified with pill boxes; main Brit. objective of third battle of Ypres. Right of ridge seized at fifth attempt (Oct. 5, 1917), when advance made through quagmires amidst storm; ruins of village captured (Oct. 6), by Canadians, but northern advance along ridge checked; position lost during Ger. offensive beginning April 9, 1918; recovered by Belgians in victorious advance of Oct. 15, 1918.

PASSION-FLOWER (*Passiflora*), a genus of tendrillar climbing plants characterised by peculiar pentamerous flowers, possessing elaborate corona with ovary at the apex; fruit, a berry.

PASSIONISTS.—'The Congregation of Discalced Clerks of the Most Holy Cross and Passion of our Lord Jesus Christ' was founded by St. Paul of the Cross, about 1730, its rule being approved, in 1741, by Benedict XIV. Its aim is specially to bring before the faithful the memory of Christ's Passion, and the work of the Congregation consists largely in the holding of parochial missions. The P. were introduced into England, in 1841, and have now twelve houses in the Anglo-Hibernian province, with 181 members. There is also a second order, of P. nuns, founded in England, in 1850.

PASSION PLAY, a dramatic performance representing the last scenes of Christ's life; in many respects similar to the mystery or miracle plays; flourished towards the end of the Middle Ages, especially among the peasantry of Germany and Bohemia; in modern times chiefly represented by the Passion play of Ober-Ammergau (Bavaria).

PASSION WEEK commences on Passion Sunday, a fortnight before Easter; Lenten fast.

PASSOVER, a Jewish feast, observed in memory of the coming out of Egypt. The feast was instituted traditionally by Moses at the command of the Lord. A lamb was to be killed on the evening of the 14th of Nisan, and its blood sprinkled on the lintel and doorposts. It was to be roasted and eaten by the people. who were to be ready equipped for a journey. For a week afterwards only unleavened bread was to be eaten. The origin and exact meaning of the feast is still obscure, and the different documents which compose the Pentateuch show different versions of it. Probably a pastoral festival in which a lamb was sacrificed was combined with an agricultural feast which the Israelites may already have found in Canaan.

PASSPORT, document entitling foreigners to travel in country.

PASTE, usually made by mixing flour with water (about two pounds to the gallon). The water is added gradually and the whole well mixed. An ounce of alum is added to increase the adhesiveness, and the whole boiled and well stirred. Bookbinders usually add about an ounce and a half of resin instead of the alum, thus getting a thicker and still more tenacious P. Various polishing Ps. are manufactured. For brasswork, a good one can be made by mixing two parts of soft soap with four of rottenstone; for iron, a mixture of emery powder and lard; and for wood, by adding turpentine to beeswax until a soft P. is obtained. For paste gems, see GEMS.

PASTEL or **CRAYON DRAWING**, the name applied to a method of painting with dry pigments. It has been practised in England from an early date, and John Riley, 1646-91, produced many works in P. But Francis Cotes, 1725-70, was the first Englishman to fully develop the art, and his portraits of Mr. and Mrs. Joab Bates and Lord Hawke testify to his high ability. He was followed by John Russell, R.A., 1765-1806, who brought the art to perfection. But it was not only a favorite medium in England (especially for portraiture), but also on the Continent, such names as Rosalba Carriera and the great master, Quentin de la Tour, being conspicuous. In more modern times it has been practised by Millet and Whistler.

PASTEUR, LOUIS (1822-95), Fr. chemist; first appointment was prof. of physics in the *lycee* at Dijon; deputy prof. and,1852, prof. of physical chem. at Strasbourg; dean of the faculty of science at Lille, 1854. He held various appointments in Paris from 1857 till he became director of the Pasteur Institute; studied crystallography, and showed the relation between optical activity and molecular asymmetry, thus laying the foundations of stereochemistry; best known for his work on micro-organisms; showed that alcoholic and acetic fermentation and putrefaction are caused by living organisms, and that when these are killed or excluded decay is prevented. Thus he opposed the idea of spontaneous generation, and introduced sterilization.

Studies on wine, beer, and the silkworm disease led to investigation of the cause and means of prevention and cure of virulent diseases (*e.g.*, hydrophobia), to the germ theory of disease, and the principles of preventive medicine, of which the Pasteur Institute is the enduring memorial. See BACTERIOLOGY.

PASTEURISATION. The process of sterilising substances by subjecting them for a given length of time to high temperature. The process is widely used for the treatment of milk. It consists of heating the milk to a temperature of 145° to 170° F. for a period of ten to thirty minutes, the longer time being used at the lower temperature. The milk is then cooled rapidly. Treatment at these temperatures kills all pathogenic organisms, but does not produce the chemical changes in the milk which occur at boiling temperature. Moreover, at the lower temperature of 145° F. which is generally used in America, the anti-scorbutic vitamins (which are held to be of such great importance when the milk is used for feeding infants) are not, apparently, affected. The flavor of the milk is not quite the same as that of untreated milk, but the change is not nearly as pronounced as when the milk is boiled. A home-made pasteurising outfit can be made by using ordinary milk bottles and a large pail. The pail is partly filled with boiling water and the full bottles are then placed in it. The water should reach to the rim at the top of the bottles. Covers are placed on the bottles and the whole is set aside to cool for thirty minutes. The bottles are then cooled rapidly by standing in cold, running water.

Pasteurisation of milk has become very common in recent years, and in many large cities is universally adopted by the dairy companies. Milk so handled is equally as nourishing as raw milk, but when infants are fed on pasteurised milk it is good practice to give them small quantities of orange juice or tomato juice in order to ensure a sufficient supply of anti-scorbutic vitamin and so avoid the occurrence of scurvy. It is also advisable not to keep pasteurised milk more than twenty-four hours after it is received.

PASTO (1° 16′ N., 77° 20′ W.), city, Cauca, Colombia, at foot of P. volcano; woolens, Pop. 13,500.

PASTON LETTERS, collection of correspondence and miscellaneous papers of Paston family between 1422-1509; throw much light on contemporary history and law; sold by William Paston, Earl of Yarmouth; passed through several hands; purchased, 1774, and edited by John Fenn; original manuscripts presented to George III.; lost trace of; authenticity doubted till vindicated by Gairdner, 1865; rediscovered at various times between 1875-89; majority in Brit. Museum.

PASTOR, or ROSE-COLORED STARLING (*Pastor roseus*), a beautiful member of the starling family. The adult bird has a long crest which, like the head, neck, and throat, is glossy violet-black; the back, shoulders, and under surface are a delicate rose-pink, and the wings and tail greenish-black. It is common in India and, occasionally, visits Europe in considerable numbers, when a few solitary birds reach Britain. It is one of the most active checks upon locusts.

PASTORAL EPISTLES, *i. e. 1* and *2 Timothy* and *Titus* (*qq.v.*).

PASTORAL LETTER, document written by bishop to his congregation; read by clergy from pulpit.

PASTORAL RING, a ring worn by bishops on the ring finger of the right hand.

PASTRY. See Cooking.

PASTURE, MRS. HENRY DE LA (LADY CLIFFORD), *nee* Elizabeth Lydia Rosabelle, Eng. novelist and dramatist, eldest *d.* of Edward Bonham; married first, 1887, Henry de la Pasture, second, 1910, Sir Hugh Clifford; pub. *The Little Squire* (dramatized in 1894), *A Toy Tragedy* (done into Braille), *Catherine's Child, The Lonely Lady of Grosvenor Square, Erica,* 1912; *Michael Ferris,* 1913; plays: *Peter's Mother,* 100 nights), *Apollo, Deborah,* etc.

PASTURE, strictly a term applied to permanent grass land which is grazed, but never mown, but often applied also to land which is both grazed and mown. Permanent P. is land which has been continuously under grass since it was sown from seeds, or since it went out of cultivation, and was allowed to sow itself. A temporary pasture or ley remains down for a limited period of from one to six years, and afterwards is ploughed up. For this purpose the quicker-growing clovers and grasses are sown, to reach maturity within the period of the ley and yet to yield a uniform rate of produce throughout the period. P. land in the United States has greatly increased since about 1870, and much of it is of inferior quality. The possibility of improving it by judicious manuring has been amply demonstrated on every kind of soil; while many farmers have found it profitable to plough up poor Ps., and after cropping the land for a year or two, to sow it with pure and more suitable seeds.

PATAGONIA, extensive region in S. of S. America (40°-52° S,m 63°-75° W.), stretching from Rio Negro on N. to Straits of Magellan on S., and divided in two by Andes. Portion E. of Andes, recognized since 1881 as belonging to Argentina, consists of vast plateau region rising in succession of terraces occasionally crossed by valleys; these plains are covered mostly by shingle, stones, and rock, and are almost destitute of vegetation except in parts where coarse grass and bushes grow; in hollows lakes are frequent. Chief rivers are Rio Negro, Chubut, Chico, and Santa Cruz; most fertile and productive country to be found at base of Andes; gold, silver, copper, lead, coal abundant, but not worked; large tracts devoted to rearing of horses and cattle. Area, 320,800 sq. m.; pop. 90,000. To W. of Andes is Chilean Patagonia, strip of rugged mountainous country with luxuriant forests. Area, 75,000 sq. m.; pop. 107,000. Patagonia was discovered by Magellan in 1520, and explored by Gamboa and many others. See Map South America

PATAN (27° 38′ N., 85° 17′ E.), town, Nepal, India. Pop. 31,000.

PATAN (22° 51′ N., 72° 10′ E.), town, Baroda, India, on Saraswati. Pop. 35,000.

PATARA (36° 12′ N., 39° 21′ E.), ancient city, Lycia; chief seat of the worship of Apollo.

PATAVIUM (45° 23′ N., 11° 53′ E.), aneient town, Italy, on site of modern Padua; was an important trading centre under Romans; sacked by Attila, 452.

PATCHOULI (*Pogostemon patchouli*), a shrubby plant (order *Labiatae*) bearing spikes of white flowers with purple marks. Its leaves are distilled to yield a volatile oil, and the plants are dried for stuffing mattresses and pillows, the odor being supposed to be disinfectant.

PATÉ DE FOIE GRAS, a dish made from the enlarged livers of overfed geese. It is much relished by epicures, and is produced chiefly in Russia.

PATENTS. Almost all governments grant exclusive title and rights to an individual for a limited period in the manufacture and sale of an article he invents. Before letters patent are issued to an inventor he must satisfy a government that the device, manufacturing formula, method or design for which he seeks protection was not known or used by persons other than the inventor, had not been patented in any country before, and was not in public use or on sale for a stated period (in the United States two years) prior to the application for a patent. Upon conforming to established procedure and paying the required fees, an inventor in the United States is granted the exclusive right to make, use and sell his invention or discovery throughout American territory for 17 years. In the case of a design the period of protection may be 3½, 7 or 14 years, as the designer may elect. American patent laws exclude the granting of rights to importers of foreign inventions by providing that a patent be issued only to the original and first inventor, though an inventor may assign his interest to others, wholly or in part, and joint patents may also be issued to joint inventors.

England began granting patents in the sixteenth century and the United States in the colonial period. The system has become elaborately developed and interwoven with international interests. Reciprocity treaties between the United States and other nations aid American inventors in foreign countries in regard to the working of the inventions, while under conventions adopted by the International Congress of American States (approved by the United States), persons who obtain patents in any one of the signatory states shall enjoy in each of the other states all the advantages granted by their laws relative to patents of inventions, designs and industrial models. Patents may be reissued after the original grant has become inoperative or invalid. For infringement of his patent an inventor may sue for damages in a federal circuit court. Patents granted in 1921 by the U. S. Patent Office in Washington, D. C., including reissues and designs, numbered 41,401, out of 93,328 applications received.

PATER, WALTER HORATIO (1839-94), Eng. author; *b.* in London. His prose is of the prose-poetry type, and includes the famous *Studies in the History of the Renaissance, Marius the Epicurean,* and *Appreciations.*

PATERNO (37° 32′ N., 14° 53′ E.), town, ancient *Hybla,* Catania, Sicily. Pop. 25,000.

PATERNOSTER, the name given to the Lord's Prayer from its opening words in the Latin form. It was given by our Lord to the disciples as the model of their prayers, and has been used by Christians throughout all the ages. It appears in all ancient liturgies, and is also used in the choir offices.

PATERSON, a city of New Jersey, in Passaic co., of which it is the county seat. It is on the Erie, the New York, Susquehanna and Western, and the Delaware, Lackawanna and Western railroads, and on the Passaic river and the Morris canal. Paterson is one of the most important manufacturing cities in the country and is chiefly noted for its silk industries. It is often called the Lyons of America. The city is built partly on the slopes of a range of hills and partly on a broad plain. In addition to its silk industry there are plants for the manufacture of aeroplane motors, electrical motors, locomotives, thread, twine, yarn, shirts, etc. The city has an area of 8½ square miles. It has over 100 mile of paved streets, and an excellent system of schools. Among the local attractions are Passaic Falls, where the river drops over a 70 foot precipice. The public buildings include a city hall, court house and a high school. Paterson was founded in 1791 by a society formed by Alexander Hamilton, for the purpose of encouraging American manufacture and to make the United States industrially as well as politically independent of Europe. It was named in honor of William Paterson, at that time governor of New Jersey. It was incorporated as a city in 1851. Pop. 1920, 135,866.

PATERSON, WILLIAM (1658-1719), founder of the Bank of England, and a director, 1694; *s.* of Dumfriesshire farmer; became important in the City of London as a member of the Merchant Taylors' Company; established the Darien colony, 1698, bnt could not prevent its failure; persuaded the Government to adopt scheme for consolidation and conversion of the National Debt, 1717; his financial proposals were embodied in Walpole's Sinking Fund; gave active assistance in Union of England and Scotland.

PATHOLOGY, the science which treats of the causes, nature, and results of diseases, generally divided into (a) *General Pathology*; (b) *Special Pathology*. General pathology includes *inflammation,* or the series of phenomena arising in normal tissues from the action of a chemical or physical irritant, the most common being the action of bacteria, and *repair,* the process of restoration of

amaged tissues; *degenerations* and *in-ltrations*, the former being the retro-rade conversion of the complex proto-lasm of a cell into a simpler substance—*g.*, fat or colloid material—and the tter being the deposition of a new ıbstance—*e.g.*, fat in an otherwise naltered cell; *necrosis*, cellulardeath in part of the tissues, and *gangrene*, death f the tissues in mass; *pigmentation*, ıe abnormal deposition of coloring ıaterial in the tissues, usually in the ells; *atrophy*, abnormal decrease in the ze and number or the size alone of the lements of a normal tissue, and *hyper-ophy*, abnormal increase in the size of ıe elements of a normal tissue, the erm *hyperplasia* being applied to in-rease in number; *malformations*, errors ı development of various parts of the ody—*e.g.*, *hare-lip*, due to incomplete evelopment of the upper jaw; *tumors*, bnormal local growths of new tissue, ith no physiological function, which ıay be either *innocent*—*i.e.* resembling ıe tissue from which it springs, re-ricted in growth, and only harmful ırough pressure—or *malignant*, of more r less embryonic nature, irregularly ıvading the surrounding tissues and ith a tendency to reproduce itself in ther parts of the body, eventually ausing death; *granulonata*, including ıose chronic infective diseases with a ıaracteristic lesion resembling granu-ation tissues—*e.g.* tuberculosis, syphilis, prosy, glanders, actinomycosis; *dis-ases of the blood*—*e.g.*, pernicious anae-ıia, leucocythaemia; *oedema* and *dropsy* -the former being the undue accumula-on of lymph between the cells of a ssue, causing it to swell, and the latter ıe accumulation of lymph in one or ther of the body cavities; *thrombosis* ıd *embolism*—the former being coag-ation of the blood in a part of the rculatory system, and the latter the ıpaction of a body, usually part of a ırombus or clot, in a vessel too small to low it to pass further; *animal parasites* the human body, tapeworms, thread-orms, flukeworms, and protozoa. *Bac-ria* are not generally included under ıe heading of general pathology, but ıder the special heading of *bacteriology*. ıecial pathology includes the different anifestations of diseases in the various rgans, the results of a particuiar disease morbid condition being naturally ore or less widely divergent in different ssues and organs.

The modern science of pathology is unded upon the researches of Rudolf rchow, 1821-1902 and Sir James Paget 14-99, the *Cellular Pathology* of the rmer being pub. in 1850, and the *ctures on Surgical Pathology* of the tter delivered during the six years pre-ceding publication in 1853. With the introduction of improved methods of experiment and investigation the science made rapid strides in the last quarter of the 19th cent., the discoveries of Koch, working on the lines initiated by Pasteur, of the bacillus of anthrax in 1876 and of tuberculosis in 1882, being perhaps the most notable and the most far-reaching in effect. At the present time considerable attention is being devoted by pathologists to investigation regarding the bacterial and parasitic origins of various diseases—cancer for instance, a subject engaging at present much patient and elaborate research, being attributed by some authorities, so far on insufficient grounds, to such causes; while the pathology of the nervous system, including the localization of function on the cortex of the brain and cerebellum, and the pathology of the blood and blood-forming tissues, are also among the most important problems now in process of investigation.

PATIALA, PUTTALIA (30° 20′ N., 76° 25′ E.′ native state, Punjab, India. Pop. 1911, 1,407,659. Capital, Patiala Pop. 25,000.

PATINO, JOSÉ (1666-1736), Span. statesman; sec. of navy and Indies, 1726, and afterwards of finance; Minister of War, 1720; connteracting influence to misrule given by Philip V., Alberoni and Ripperda.

PATKUL, JOHANN REINHOLD (1660-1707), Livonian patriot; led Livonian opposition to Sweden; formed leagues of northern powers for partition of Sweden; delivered by Saxony to Sweden and broken on wheel.

PATMORE, COVENTRY KERSEY DIGHTON (1823-96), Eng. poet and critic; *b.* at Woodford Essex; in 1847 he became a librarian at the Brit. Museum. his poetry is delicate, chaste, and melodious. The best of his works is *The Angel in the House*, consisting of the four parts—*The Betrothal*, *The Espousals*, *Faithful for Ever*, and *The Victories of Love*.

PATMOS (37° 20′ N., 26° 33′ E.), one of Sporades Islands, Ægean, belonging to Greece; area, 20 sq. miles; here St. John lived in exile and, according to tradition, wrote Apocalypse; site of monastery of St. John. Pop., 4000.

PATNA (29° 30′ N., 83° E.) native state, Bihar and Orissa, India. Pop. 285,000.

PATNA (20° 35′ N., 83° 4′ E.), capital of Bihar and Orissa, India, on Ganges, stretching almost 9 miles along right bank; Gov. headquarters college, and

other educational institutions; famous for massacre of P., 1763, and Sepoy Mutiny, 1857; important commercial centre; rice, opium indigo, cotton, salt. Pop. 1921, 120,109.

PATOIS, a French word applied to the dialects of Picardy, Gascony, Provence, etc. It is often synonymous with 'the language of the people.'

PATON, JAMES MORTON (1863), American archaeologist; *b.* New York City. He graduated at New York University in 1883, pursued post-graduate studies at Harvard, 1884-87, and at the University of Bonn, Germany, 1891-92. He was professor of Latin at Middlebury College, 1887-91 and occupied the chair of Greek at Wesleyan, 1895-1905. From 1906 until 1908 he was managing editor of the American Journal of Archaeology and later became editor in chief of that periodical, 1917-20. He is a member of many learned societies in America and abroad.

PATON, JOHN GIBSON (1824-1907), a Scottish missionary; worked for ten years with the Glasgow City Mission. In 1858, he sailed to Tanna, in the New Hebrides, where he ministered to cannibals, and in 1862, he began his wonderfully successful mission in Aniwa, where, by 1882, he had converted all the islanders.

PATON, SIR JOSEPH NOEL (1821-1901), Scot. painter; noted works are *Reconciliation of Oberon and Titania* and *Quarrel of Oberon and Titania* (both in Edinburgh National Gallery), and *The Pursuit of Pleasure.* Wrote two vol's of poems.

PATRAS (38° 14′ N., 21° 44′ E.), fortified town, W. Greece; Orthodox archiepiscopal see; has cathedral; exports large quantities of currants, also olives, olive oil, wine, etc. Pop. 40,000.

PATRIARCH (Gk. *marpiapxns,* the head of a family); 1. The name given to the fathers of the human race, spoken of in the Scripture history, such as Noah and also to the great progenitors of the Hebrew race, Abraham, Isaac, Jacob, and Jacob's twelve sons. 2. The name is also given in the Christian Church to the bishops of certain metropolitan sees, especially in the East. The sixth cannon of the Nicene Council mentions Rome, Antioch, and Alexandria as the three metropolitan sees at that time.

PATRICIAN (Lat. *patricius*).—(1) Rom. noble. Rom. *populus* was divided into *gentes* or clans, each descended from common ancestor; head of *gens* was also its father, *pater*; besides those so descended, the p's, the *gens* contained aliens named clients. Ontside the *gentes* there was the *plebs,* without rights of citizenship, possibly composed of outlawed members of *gentes*; plebs was admitted to some civil rights before fall of monarchy and gradually won equality. (2) title conferred at will by Byzantine emperor; also given under late empire to provincial gov. (3) use retained in Ital. cities where title is applied to hereditary noble.

PATRICK, ST. (*c.* 387-461 A.D.) patron saint of Ireland; subject of many legends; *b.* probably in Glamorganshire, Wales; he was carried off to Ireland by pirates about 405; escaped after six years, and fled to Lérins in Gaul. He formed the idea of evangelising Ireland. In 432 he was consecrated and went to Ireland, where Christianity had already some footing. He preached vigorously, and to him the real conversion of Ireland is due.

PATRICK, MARY MILLS (1850), American educator; *b.* Canterbury, N.H. She studied at Lyons College, Iowa, 1866-69, and later studied at the Universities of Zurich, Leipzig and Berlin. Since 1890 she has been president of the American College for Girls at Constantinople, Turkey. She has been delegate to psychological and philosophical congresses in several European capitals. Her publications include *Armenian Translation of Textbook of Physiology,* 1876; *Sextus Empiricus and Greek Skepticism,* 1899; *Sappho and the Island Lesbos,* 1912. She has written many magazine articles on educational subjects and contributed to Hastings' Dictionary of Religion.

PATRICK, MASON MATTHEWS (1863), Army Officer. *B.* in Lewisburg, W. Va. Graduated from the United States Military Academy, in 1886, and in the same year commissioned additional second lieutenant of engineers. He was promoted through the various grades to major general in 1921. In 1916-1917 commanded the 1st Regiment of Engineers and in the same year commandant of the Engineer School at the Washington Barracks. With American Expeditionary Forces in France from 1917-18 as chief engineer of lines of communication and director of construction and forestry operations. In 1918-19 chief of Air Service with American Expeditionary Forces. Since 1921 chief of Air Service.

PATRICK, SIMON (1626-1707), bp. of Chichester, 1689; dean of Peterborough, 1691.

PATRIOTIC SOCIETIES. Of the numerous organizations in the United

States which were founded and became perpetuated by bonds of patriotism, the most prominent are those composed of descendants of early settlers and of participants in past wars, and survivors of recent wars. Their activities embrace the restoration and preservation of historic sites, the celebration of anniversaries of outstanding historical events and the fostering of fraternal goodwill. The societies can be grouped generally into those representative of the Colonial period, the Revolutionary War, the Civil War, the Spanish-American War and the World War. The colonial bodies include the Society of Mayflower Descendants, Society of Colonial Wars, Order of the Founders and Patriots of America, Society of Colonial Dames, and the Holland Society. The Revolutionary era is commemorated by the Society of the Cincinnati, Society of the Descendants of the Signers of the Declaration of Independence, Society of the Dames of the Revolution, Society of the Daughters of the American Revolution and many other bodies. A variety of societies were engendered by the Civil War, from both the Union and Confederate sides, and include the Grand Army of the Republic, the Loyal Legion, the Union Veteran League, the United Confederate Veterans, United Sons of Confederate Veterans and United Daughters of the Confederacy. The Spanish-American war is chiefly represented by the United Spanish War Veterans. The World War produced, among other associations, the American Legion, Veterans of Foreign Wars, 78th ('Lightning') Division of the Veterans of the World War, vision of the Veterans of the World War, and the National American War Mothers, 1922. The War of 1812, the Mexican War, and conflicts with the Indians, Cubans, and Filipinos formed the mainspring for the creation of a group of other patriotic societies.

PATROL (Fr. *patroniller*, connected with *patte*, foot), the word used to describe a detachment of police, troops, etc., who are engaged in 'patrolling.' This consists in traversing a specified *round* or *beat*, particularly in military camps and garrison towns, in order to protect the positions, and to re-connoitre the movements of the enemy. A 'horse patrol' or 'mounted patrol' is the detachment of cavalry sent out in advance of the regiment to reconnoitre the country and gain information as to the position and movements of the enemy. See CAVALRY.

PATRON (Lat. *patronus*, from *pater*, father), an important term in Roman law. It was the duty of the *patroni* to safeguard the interests of his *clientes* (dependents), men, that is, who were not admitted to the full rights of citizenship. The P. fed, boarded, and advised his client, gave him land usually, and was his representative in the eyes of the law. In return the client obeyed him, followed him to war, and gave him pecuniary aid. In the latter days of the republic the client was practically a free citizen; under the empire he was often merely a sycophant of his P's households. Technically, a P. in this country is one who has church living in his gift, but the word is generally used of all benefactors and protectors, including the saints.

PATROONS, the name given to the lords of the manor in early colonial days in New Amsterdam. They were permitted to take up large sections of land in the state, provided they settled a number of tenants thereon. The evils of the system culminated in the anti-rent war which put an end to these tenures. The largest of these manors were in Albany and Renssalaer counties.

PATTEE, FRED LEWIS (1863), an American college professor, *b.* at Bristol, N. H., *s.* of Lewis F. and Mary P. Ingalls Pattee. He graduated from Dartmouth in 1888, and was professor of American literature at Pennsylvania State College from 1894. Author: *The Wine of May and Other Lyrics*, 1893; *A History of American Literature*, 1896; *Mary Garvin*, 1902; *The House of Black Ring*, 1905; *The Breaking Point*, 1911; *Compelled Men*, 1913; *History of American Literature Since 1870*, 1915, and others; also editor; *Shakespeare's Macbeth*, 1897, and *Century Readings in American Literature*, 1919.

PATTEN, SIMON NELSON (1852), an American university professor, *b.* at Sandwich, Ill., *s.* of William and Elizabeth Pratt Patten. He was educated at Northwestern University and at Halle, Germany. He was principal of various public schools in Illinois and Iowa from 1882-8 and was professor of political economy at the University of Pennsylvania from then until 1917. Author: *Premises of Political Economy*, 1885; *Theory of Social Forces*, 1896; *The New Basis of Civilization*, 1907; *Product and Climax*, 1909; *The Social Basis of Religion*, 1911; *Reconstruction of Economic Theory*, 1912, and *Culture and War*, 1916.

PATTEN, WILLIAM (1861), Zoologist. *B.* at Watertown, Mass. In 1883 graduated from the Lawrence Scientific School, (Harvard). In 1886-89 assistant in Lake Laboratory, Milwaukee, Wisc. and from 1889-93 professor of biology at University of North Dakota. Since 1893

at Dartmouth College as professor of zoology. Author of: *The Evolution of the Vertebrates and Their Kin*, 1912; *The Grand Strategy of Evolution*, 1920. Wrote for American and German scientific papers on various subjects including the structure of eyes and the origin of the vertebrates.

PATTERSON, JOSEPH MEDILL (1879), Author. *B.* at Chicago, Ill. In 1901 graduated from Yale College. For four years, 1901-1905 with a Chicago paper and since 1914 co-editor and publisher of same. President of a New York news syndicate and vice president of an Ontario paper company. Was a member in 1903 of the Illinois House of Representative and from 1905-1906 commissioner of public works in Chicago. Had been a war correspondent in various countries. Enlisted in World War as private and rose to captain. Saw action in France at 2nd battle of the Marne and other places. Author of: *A Little Brother of the Rich*, *Dope*, *The Fourth Estate* (with J. Keeley and Harriet Ford), *By-Products*, *Rebellion*.

PATTESON, JOHN COLERIDGE (1827-71), bp. of Melanesia, 1861; murdered by natives by mistake.

PATTI (38° 8′ N., 15° E.), seaport, Messina, Sicily, on Gulf of Patti. Pop. 5,600.

PATTI, ADELINA (BARONESS CEDERSTRÖM) (1843-1919), operatic singer; *b.* at Madrid; appeared in New York, 1859 and London, 1861; equally successful in concert and opera; the favorite of two continents; married first Marquis de Caux, 1868, divorced, 1885, then m. Nicolini, 1886, and, after his death, Baron Cederström, 1899.

PATTISON, MARK (1813-84), Eng. author; at Oxford, came under influence of Newman, but abandoned Catholicism for agnosticism. His writings are numerous, and perhaps best known is *Milton*.

PATTULO, GEORGE (1879), Author. *B.* at Woodstock, Ontario, Canada. Educated at the Woodstock Collegiate Institute. In newspaper work until 1908 at Montreal, London and Boston. Author of: *The Untamed*, 1911; *The Sheriff of Badger*, 1912. also wrote short stories for various magazines. Was the special correspondent of a magazine with the American Expeditionary Forces in France, 1917-1918, and in Germany, 1919.

PAU (43° 18′ N., 0° 20′ W.), chief town, Basses-Pyrenees, France, on Gave-de-Pau; fine castle (XIV. cent.); former capital of province of Bearn; birthplace of General Bernadotte; winter health-resort; linen, chocolate, hams, Jurancon wine. Pop. 40,000.

PAU, PAUL (1848), Fr. soldier; *b.* Montelimar; educated at Saint-Cyr, 1867; fought in the Franco-Prussian War, 1870-1, when he lost an arm; general of division, 1903; commanded 16th Corps at Montpellier and 20th Corps at Nancy; at outbreak of World War was in command of the abortive Fr. offensive into Alsace (Aug. 1914); subsequently superintended attack of 6th Fr. Army under Maunoury on the Ger. right flank at the battle of the Marne (Sept. 1914).

PAUL, THE APOSTLE, greatest figure in the history of Christianity after Christ Himself. The sources of information for his life which we possess are Acts of the Apostles and his own epistles; some reliable information may be gained from early tradition. From these sources the following facts appear: he was *b.* at Tarsus, his *f.* being a Jew in the possession of Roman citizenship; he himself therefore was free born. Of the tribe of Benjamin, he received the tribal name of Saul and also Roman name Paul; learned trade of tentmaker, and studied under Gamaliel at Jerusalem; showed strong Pharisaical tendencies; was a determined opponent of Christianity, believing it to be opposed to the will of God; considered it a sacred duty to persecute the Christians to the utmost; was appointed agent by the Sanhedrin to exterminate the Christian church at Damascus; on the way thither had the vision of Jesus which changes his career, and from being an opponent of Christianity became its strongest supporter; baptized by Ananias and began to declare that Jesus was the Son of God. The next three years were spent in Arabia; then he returned to Damascus, from which he had to escape owing to the opposition of the Jews; went to Jerusalem and preached the gospel, all suspicion of his genuineness being removed by the support of Barnabas.

The next seven years were apparently spent in Syria and Cilicia. He was invited by Barnabas to help him in superintending the revival which had taken place at Antioch, the outcome of which was the determination to begin the spread of the gospel throughout the Roman Empire; sent to Jerusalem with help of the church there, which was suffering from the famine of A.D. 44; commissioned by the leaders there as apostle to the Gentiles, along with Barnabas. A large part of Paul's life was taken up with missionary travels.

First Missionary Journey.—Accompanied by Barnabas and Mark, he went to Cyprus, visited Paphos, its chief

town, converted the Roman governor, founded a Christian church, became known as Paul and acknowledged as head of the missionary movement; visited Perga, Pamphylia, Pisidia, and Lycaonia (at Perga deserted by Mark); went to Antioch in Pisidia, and Iconium, Lystra, and Derbe, and returned to the Syrian Antioch, which had been his starting-point. On this journey they were welcomed by Gentile proselytes, listened to by heathen Gentiles, opposed by Jews, rejected sometimes with violence by heathen people; yet their influence was left, converts were made, and several churches founded. The success of this preaching tour lay not merely among the Jews, but also among the proselytes and adherents of Judaism from the heathen. As soon, however, as these converts were formed into Christian congregations along with Jewish converts, there arose difficulties of a practical kind. The synod at Jerusalem, however, was content to require from the new converts that they should abstain from things strangled and from blood; that they should refrain from eating food which had been offered to idols; and that they should abstain from fornication.

Second Missionary Journey.—As the result of a difference of opinion with regard to Mark, Paul and Barnabas separated, Paul undertaking to visit the churches on the mainland. Accompanied by Silvanus, he visited the churches which were founded on his first missionary journey, and made known to them the decisions of Council at Jerusalem; at Lystra took Timothy as his assistant; as a result of a vision he visited Europe, travelled to Neapolis, Philippi, Thessalonica, Beroea, Athens ,and Corinth. The superstition of the people was a constant source of trouble; the attitude of the civil authorities also created difficulties, while persecution proved a hindrance; nevertheless success attended the efforts of the missionaries. Returning to Jerusalem, Paul differed from Peter regarding status of the circumcised and uncircumcised, and he rebuked Peter for 'dissembling.'

Third Missionary Journey.—Visited Galatia, Phrygia, Ephesus; remained three years in Ephesus, where the temple of the goddess Diana was situated, but forced to leave owing to organized opposition; during his three years' visit Christianity was established in the city and in the towns in the neighborhood; went to Troas, Macedonia, Illyria, and Greece; reached Corinth and set out for Jerusalem, and thus ended his third missionary journey.

At Jerusalem a tumult arose; he was attacked as an opponent of the traditions of the fathers; defended himself in address to the people and the Sanhedrin; taken under protection of Roman guards, transferred for safety to Caesarea, under the care of the procurator Felix; left in prison for two years; brought before Festus, who succeeded Felix; appealed to Rome, and reached that city a prisoner, after an adventurous journey by seas and land; remained at Rome, a prisoner in his own hired house, for two years; tried and acquitted; travelled to Colossae, Crete Nicopolis, and went probably as far as Spain; second imprisonment took place, followed by trial, condemnation, and death (A. D. 64).

Paul was the author of thirteen epistles contained in the N.T.; 1 and 2 Thessalonians, 1 and 2 Corinthians, Galatians, Romans, Colossians, Philemon, Ephesians, Philippians, 1 and 2 Timothy, Titus. These letters or epistles are not systematic treatises, but were called forth by special occasions, such as the necessity for sending advice to his friends or to the churches under his care, and with the exception of Romans, which was meant to be an introduction of himself to Rome and a declaration of his message, were written rapidly as circumstances demanded; yet through them all there runs one great theme—the glory of God and the exaltation of Jesus Christ His Son, the Savior.

PAUL, DE ST. VINCENT. See VINCENT DE ST. PAUL.

PAUL I., PETROVICH (1745-1801), Tsar of Russia; hatred of republicanism led to his successful but exhausting war with France, 1799; upheld Napoleon after his overthrow of republic.

PAUL III., Pope.

PAUL V., Pope.

PAUL OF SAMOSATA, patriarch of Antioch, *c.* 260-72; raised great storm by heresies, specially opposition to doctrine of Trinity; evolved doctrine that the Son was 'consubstantial' with the Father; condemned and deposed by Council, 269, but Antioch supported him; expelled by decree of Ital. bp's, 272; 'Paulicians' (*q.v.*) or 'Samosatans' were long important.

PAUL OF THE CROSS, ST., PAOLO DELLA CROCE (1694-1775), founder of Passionist Fathers ('of the Most Holy Cross and Passion'), which was fully sanctioned, 1737; canonised, 1867.

PAUL, THE DEACON (*c.* 720-800), Lombard historian; little known of his life; *s.* of Lombard noble, Warnefrid; became instructor of king's *d.*, and subsequently Benedictine monk at Monte Cassino; chief work incomplete, but

valuable, *Historia gentis Langobardorum.*

PAULDING, JAMES KIRKE (1779-1860), American author; *b.* Nine Partners, Dutchess County, New York. Through his family connections, he became acquainted with Washington Irving, and in conjunction with him brought out the first numbers of the satiric literary periodical Salmagundi, which was soon however, discontinued owing to financial troubles. He attracted considerable attention in 1812 by the publication of *The Diverting History of John Bull and Brother Jonathan,* bearing on the tension between the two nations that soon afterward resulted in war. Other literary ventures were *The Backwoodsman,* 1918; *Koningsmarks,* 1823; *The Merry Tales of the Three Wise Men of Gotham,* 1826 and *Chronicle of the City of Gotham,* 1930. To this latter date belongs also *The Dutchman's Fireside,* which achieved great popularity. He became Secretary of the Navy in 1837 and on his retirement from that post in 1841 again devoted himself to literature. He published *The Old Continental* in 1846 and *The Puritan and His Daughter,* in 1849. He wrote considerable verse, some of it clever and humorous in spots, but for the most part doggerel.

PAULICIANS, an Armenian sect first mentioned by the patriarch, Nerses II., 553 A.D. An account is given of them in an anonymous document included in the Chronicle of Georgius Monachus (this document is called Esc.). The P's (it says) were so called after Paul of Samosata, but their founder was Constantine of Mananali. They were persecuted by the Emperor Leo. V. and the Empress Theodora, who is said to have slaughtered 100,000. They spread over Bulgaria, Syria, and Cilicia, and are mentioned in Armenian writings down to the XIII. cent., then not till the XVIII.

PAULINUS, ST., OF NOLA (353-431), of good family; consul, 378, then became Christian, and later ordained; bp. of Nola, 409; his letters survive and show a spiritual personality.

PAULIST FATHERS. The Congregation of Missionary Priests of St. Paul the Apostle. The society was founded in New York City in 1858, by Father Hecker and some priests, who had left the Redemptorists because many of them were Germans whose methods were not adapted to work in the United States. Father Heckers idea was to form a community of native Americans, or of those whose native language was Engilsh, for missionary work. Bishop Hughes approved of the founding of the society and Pius IX. gave it his blessing. The mother-house of the society is in New York City and branches have been established in Washington, Chicago, Austin, Texas, Winchester, Tenn., Portland, Oregon, Minneapolis, and San Francisco. The Paulists make a strong feature of mission-preaching, and are the principal promoters of the movement begun in the closing years of the 19th century to extend Roman Catholicism among those who are not of that faith. They have a central training house in Washington, D. C. In their beautiful church in New York the services are distinguished by a strict carrying out of the rubrics and Gregorian music. They also conduct the Roman Catholic Publication Society, a printing plant, and are publishers of The Catholic World. Superior-General, Very Reverend Thomas F. Burke, New York City;Fathers 77; Scholastic novices 41; Preparatory students 13, 1923.

PAULUS, HEINDRICH EBERHARD GOTTLIEB (1761-1851), Ger. theologian and Orientalist; prof. at Jena; wrote *Life of Jesus,* 1828, and interpreted New Testament on rationalist principles.

PAUMOTU, OR LOW ARCHIPELAGO (20° S., 140° W.), broad belt of *c.* 78 atolls in Pacific, belonging to France; extending over 1300 miles; largest, Rangiroa; sparsely inhabited; pearl fisheries; form altered by storms.

PAUSANIAS (fl. II. cent. A.D.), Gk. writer; nothing known of his life except that his books, *Description of Greece,* was partly written under Hadrian (*d.* 138) and Antoninus Pius, and finished *c.* 174, under Marcus Aurelius; believed to have been native of Asia Minor, probably Lydian; travelled eastward as far as Jerusalem, as far as oracle of Jupiter Ammon in Libyra, and was acquainted with Macedonia, Italy, and Spain. *Description of Greece* has often been printed. It is divided into 10 books, each treating of separate division of Greece; *i.e.* 1. Attica; 2. Argolis; 3. Laconia; 4. Messenia; 5 and 6. Elis; 7. Achaea: 8. Aracdia; 9. Boeotia; 10. Phocis.

PAUSANIAS (*d. c.* 470 B.C.), Spartan regent, 479; joint commander of Greeks with Aristides at battle of *Plataea,* 479; admiral, 478, against Persia; relieves Cyprus and recovered Byzantium.

PAVEMENT. To the Cathaginians is given the credit for first paving towns with stone. Rome was largely paved, and the Appia Via constructed by Appius Claudius Caecus; the empire was traversed by magnificent well-built roads. Mediaeval cities were unpaved till the 12th century. Modern roads are

mainly macadamised, and a special layering is usual; a covering of tar, pitch, or oil, with fine grit, is now being laid to allay the dust nuisance of rapid motor traffic. Very many town streets are still cobbled or paved with granite and basalt sets, but they have been giving place to wood pavement (jar-rah, red wood, etc.), laid on concrete, sand and mastic, with the fibre grain vertical, and pitch or Portland cement filling; or to asphalt, which is proving unsatisfactory. Footpaths are paved with flagstone of about 3 in. thickness, or concrete slabs of the same size, edged with stone blocks. Asphalt is still used largely, and is fairly durable and easy to repair. Granolithic is mucn used, and is made with small granite chips mixed with cement. Gutters are mainly of 'sets.'

PAVIA (45° 11′ N., 9° 9′ E.), ancient town of N. Italy and capital of province P., on Ticino, near confluence with Po. Outstanding features are churches of San Michele (XI. cent.), S. Pietro in Ciel d'Oro (rebuilt, *c.* 1132), S. Francesca (XI. cent.), unfinished Renaissance cathedral (XV. cent.), Castle of Visconti 1360, Palazzo Malaspina (now Museo Civico), Univ. 1361, and 5 miles N. of P. the magnificent Certosa di Pavia (Carthusian monastery); chief industries,iron foundries, chemicals. Pavia (ancient *Ticinum*) was Lombard capital, 572-774; Francis I. of France here defeated and captured by Charles V., 1525; Austrian possession, 1714; passed to Sardinia, 1859. Pop. 40,000.

PAVIA, BERNARD OF, B. CIRCA (*d.* 1213), bp. of Pavia, 1198. See CANON LAW.

PAVLOGRAD, a dist. and town, of Russia, in the gov. of Ekaterinoslav, surrounded on all sides by rivers, 57 m. N.E. of the town of Ekaterinoslav. Pop. 18,000.

PAVLOVA, ANNA, Russian dancer; first appeared on the stage at the Imperial Opera House, Petrograd; came to London 1909, and appeared at the Palace Theatre, being assisted by Michael Mordkin; made an instantaneous success; remained in London for some years, and subsequently toured in U. S.

PAVLOVO (56° N., 43° E.), town, on Oka, Nizhniy-Novgorod, Russia; cutlery. Pop. 13,500.

PAWNBROKING in U. S. A. is regulated by each state; in Boston State the police grant licences, in New York State the mayor and aldermen; interest is 3% for first 6 months, 2% per month afterwards. In some states pawned articles can be sold a year after deposit.

In France the *Monts de Piete* (originally started in Italy in the Middle Ages) are the instruments for pawn-broking. These institutions are authorised by the municipality and managed by a paid official, and the profits beyond working expenses are devoted to local charities. An official valuer decides the worth of the pledge, and at the end of the year the pledge, if not redeemed or renewed, is sold by public auction, the borrower being allowed three years to claim any surplus on the sale over the sum lent. In France, as in Great Britain, pawnbroking offers assistance to those in temporary financial difficulties, but the cost of the loan is far heavier at the private pawnbroker's than at the Mont de Piété.

PAWNEES. (Indian tribe). The main branch of the Caddoan Indians, their territory included a large part of Texas, Louisiana, and Arkansas. The tribe was divided into Republican Pawnees, and Skidi, or Pawnee Loups. They were a pastoral as well as a hunting tribe and like the Natchez and Creeks gave much time to agriculture. They lived in circular villages, in conical log-huts covered with earth. When hunting on the plains they occupied wigwams covered with buffalo hides. They were long accustomed to sacrifice a female at the beginning of the annual corn-planting, but this odious rite was abolished by a Skidi chief Pelalesharo. In 1876 the government moved them to reservations in Indian Territory,when they numbered some thousands. Though they showed bravery in warring against their hereditary enemy the Dakotans, they were the only Indians to accept slavery. For when captured they escaped the stake by offering themselves to be sold to French-Canadian traders.

PAWTUCKET, a city of Rhode Island in Providence co. It is on the New York, New Haven and Hartford Railroad, and on the Pawtucket river, 4 miles N. of Providence. It was the site of the first cotton factory built in the United States in 1790. Pawtucket is an important industrial city. It has cotton mills, woolen mills, machine shops, foundries, thread mills, etc. In all there are over 500 manufacturing establishments. It has a public library and many public and parochial schools. Pop. 1920, 64,248

PAX, tablet kissed by priest as Mass.

PAXO, ancient *Paxos* (30° 12′ N., 20° 10′ E.), one of the Ionian Islands, Greece, olive oil.

PAXSON, FREDERIC LOGAN (1877), Historian. *B.* at Philadelphia, Pa. In 1898 graduated from University of Pennsylvania. Since 1910 professor

of American History at University of Wisconsin. Author of *The Independence of the South American Republics*, 1903, 2nd edition, 1916; *The Last American Frontier*, 1910; *The Civil War*, 1911; *The New Nation*, 1915; *Guide to Materials for United States History since* 1783, *in London Archives* (with C. O. Paullin), 1914; (monographs) *Economic Mobilization for the War of* 1917; *Economic Agencies for the War of 1917*; *Recent History of the United States*, 1921.

PAYN, JAMES (1830-98), a novelist. From 1883 he was editor of the *Cornhill Magazine* until within two years of his death. His first novel, *The Foster Brothers*, appeared in 1859, and had some scores of successors, including *Lost Sir Massingberd*, *Walter's Word*, *By Proxy*, *The Canon's Ward*, and *The Talk of the Town*.

PAYNE, BRUCE RYBURN (1874), American educator; *b.* Morganton, N.C. He graduated from Trinity College, N.C. in 1896. He was principal of Morganton Academy, 1896-99; instructor at Durham High School, 1899-1902; professor of philosophy and education at Williams and Mary College, 1904-05, professor of psychology at the University of Virginia, 1906-11, and in 1911 became president of the George Peabody School College for Teachers, Nashville, Tenn. He has written Elementary Curricula of Germany, France, England and America, 1905.

PAYNE, ENOCH GEORGE (1877), College President. Educated at various colleges and universities. From 1898-1900 instructor at an academy in Kentucky and in Illinois from 1902-1903. Principal of a High School for the next four years. In 1909-1910 dean of department of education and professor of psychology at Eastern Kentucky State Normal School. At Harris Teachers' College, St. Louis, since 1910 as professor of sociology and since 1917 president. Author of *Einfuhrung der Chinesen Arbeit in Sudafrica*, 1909; *System in German Schools*, 1910; *An Experiment in Alien Labor*, 1912; *An Experiment in Motivation*, *Education in Accident Prevention*. Editor and joint author of *Education in Health*.

PAYNE, JOHN BARTON (1855), American lawyer; *b.* Pruntytown, Va. He was educated in private schools, studied law and was admitted to the bar in 1876. He was mayor of Kingwood, W. Va., 1882; practised law in Chicago, 1883-93; was judge of the Superior Court of Cook Co., 1893-98; resuned his legal practice in Chicago until 1917, when he became general counsel to the U. S. Shipping Board Emergency Fleet Corporation and to the Director General of Railroads. He was Secretary of the Interior in the cabinet of President Wilson (Feb. 1920-March 4, 1921). He was appointed Director-General of Railroads, May 18, 1920, and in 1921 was made Chairman of the American Red Cross organization by President Harding. The latter in April, 1923 appointed Mr. Payne a special commissioner to Mexico in the effort to bring about a better understanding between that country and the United States.

PAYNE, JOHN HOWARD (1791-1852), American actor and dramatist. *B.* in New York, June 9, 1791; *d.* in Tunis, Africa, April 10, 1852. He passed his boyhood at East Hampton, Long Island and studied elocution in Boston. At 14 while clerk in a counting-house he edited The Thespian Mirror. In 1809 he made his appearance as Young Norval in the tragedy of *Douglas* and toured England in 1812-13, while also writing and adapting plays. He wrote *Home, Sweet Home* for his libretto of *Calri, the Maid of Milan*, which Henry Bishop adapted to an Italian air., 1823. In 1818 his successful play *Brutus* was produced with Kean in the leading part. He edited *The Opera Glass* in London, 1826-27. Though he wrote many successful pieces, notably *Virninius* which is still performed, he was generally in financial difficulties. He served as U. S. consul at Tunis 1841-45 and from 1851 to his death. In 1883 his body was removed from Tunis to Washington.

PAYNE, PETER (*c.* 1380-1455), Eng. Lollard; teacher at Oxford; fled to Bohemia and joined Hussites; represented Bohemia at Council of Basel

PAYNE, SERENO ELISHA (1843-1914), American lawyer and legislator; *b.* Hamilton, N. Y. He graduated at the University of Rochester in 1864 and in 1866 was admitted to the bar, beginning practice at Auburn, N. Y. He engaged actively in Republican politics, held several minor political offices in Cayuga County, and in 1880 was elected to Congress, serving constantly in that body until his death with the exception of the 50th Congress. He exerted great influence in that body and from 1899 until 1910 was chairman of the Ways and Means Committee. He served as a member of the Joint High Commission charged to arrange a reciprocity treaty with Canada. He was accorded the honor of a public funeral in the House of Representatives.

PAYNE, WILL (1865), an American journalist, *b.* in Whiteside County, Ill.,

s. of William Augustus and Caroline Ferriss Payne. He received a common school education at Morrison, Ill. He was successively reporter, editorial writer, city editor and financial editor of the Chicago Daily News from 1890-6, then financial editor of the Chicago Chronicle until 1897 and financial editor of The Economist from 1897-1904. Author: *Jerry the Dreamer*, 1896; *When Love Speaks*, 1906; *The Automatic Capitalist*, 1909; *The Scarred Chin*, 1919; *Overlook House*, 1920 and others and contributed short stories to leading magazines.

PAYNE, WILLIAM MORTON (1858-1919), Educator, Literary Critic; *b.* at Newburyport, Mass. Educated in the public schools. Had been librarian and teacher in Chicago. Author of many books including *Little Leaders*, 1895; *Various Views*, 1902; *Leading American Essayists*, 1909; Translator of Björnson's '*Sigurd Slembe*', 1888; Jaeger's *Henrik Ibsen*, 1890; Bjornson's *Arnljot Gelline*, 1917 from the Norwegian. Editor of *Select Poems of Swinburne*, 1905; Swinburne's *Mary Stuart*, 1906. Wrote for magazines.

PAYSANDU (32° 27′ S., 58° 6′ W.), port and chief town of P. department, Uruguay, on river Uruguay; exports preserved meat. Pop. 21,000; (dep.) 45,000.

PEA (*Pisum sativum*), member of Leguminosae, cultivated for its edible seeds; plant a tendril climber, the tendrils representing modified leaflets, but dwarf varieties are also grown; leaves pinnate and stipulate, with alternate phyllotaxis; inflorescence is racemose, the flowers being typically papilionaceous.

PEA RIDGE, a village in Arkansas, in Benton co. Here on May 6, 7 and 8, 1862, was fought one of the most desperate battles of the Civil War. The Federal forces numbering about 11,000 were attacked by superior forces of Confederates. After a series of engagements the Confederates retreated. The total Union loss was about 1,300. The Confederate loss was not reported.

PEABODY, a town of Massachusetts, in Essex co. It is on the Boston and Maine railroad, 2 miles W. of Salem. It includes several villages. Among its industries are plants for the manufacturing of leather, morocco, boots and shoes, woolen goods, electrical supplies, etc. It has the Peabody Institute and library, and the Sutton Reference Library. Prior to 1868 the town was called South Danvers. Its name was changed in honor of George Peabody, the philanthropist, who was born here. Pop. 1920, 19,553.

PEABODY, FRANCIS GREENWOOD (1847), Theologian; *b.* at Boston, Mass. In 1869 graduated from Harvard College. 1874 ordained a minister, Pastor, 1874-1880 of First Parish Church, Cambridge. From 1881-86 Parkman professor of theology at Harvard College, Plummer professor of Christian morals, 1886-1913, professor emeritus since 1913. Author of: *Mornings in the College Chapel, Short Addresses to Young Men on Personal Religion*, 1896; *Afternoons in the College Chapel*, 1898; *Jesus Christ and the Social Question*, 1900; *Happiness*, 1903; *Religion of an Educated Man*, 1903; *Jesus Christ and the Christian Character*, 1904; *Mornings in the College Chapel*, 2nd series, 1907; *The Approach to the Social Question*, 1909; *Sunday Evenings in the College Chapel*, 1911; *The Christian Life in the Modern World*, 1914; *Religious Education of an American Citizen*, 1917; *Education for Life, the Story of Hampton Institute*, 1918; *A New England Romance*, 1920.

PEABODY, GEORGE (1795-1869), American business man and philanthropist; *b.* Danvers, Mass. His parents were poor and he was apprenticed to a grocer in his native town at the age of eleven. Later he was a clerk at Newburyport, Mass. and Georgetown, D.C. The foundation of his fortune was laid in 1813 when he formed a partnership with George Riggs and established a wholesale drygoods house at Georgetown, removing in the following year to Baltimore, Md. He prospered greatly, opened branches in New York and Philadelphia, and before long became one of the richest men in the United States. In 1843 he removed to England and there established the firm of George Peabody and Co., merchants and bankers. His public spirit and philanthropy were manifest early in his career and were accentuated as he grew older. In 1835 he saved the state of Maryland from threatened bankruptcy by disposing of $8,000,000 of its bonds in England, refusing his commission of $200,000. He founded at Danvers in 1852 the Peabody Institute and endowed it liberally. Between 1862 and 1866 he gave $1,750,000 for the benefit of London poor, the money being expended to secure better housing conditions for 20,000 people. He gave $150,000 to Harvard, a similar amount to Yale and founded the Peabody Institute at Baltimore with an endowment of $1,250,000. In 1867 he laid aside $3,600,000 for the forwarding of education in the Southern States. The United States and Great Britain vied in doing him honor. Congress conferred on him a

medal, Queen Victoria offered him a baronetcy, and when he died a public funeral was given for him in Westminister Abbey and a British battleship brought his body to this country to be buried with impressive ceremonies at Danvers, Mass.

PEABODY, GEORGE FOSTER (1852), American financier; *b.* Columbus, Ga. He received a private education, engaged in business and speedily amassed a fortune. He is president of the Broadway Realty Co., the Mexican Coal and Coke Co. and is an official and director in many banking institutions and corporate enterprises. He is a Democrat in politics and has been prominent in the councils of his party. He has taken an active interest in educational affairs and is director of the General Education Board. The Hampton and Tuskegee Institutes, the University of Georgia and similar institutions. Honorary degrees have been conferred on him by Harvard, University of Georgia and Washington and Lee University.

PEABODY, JOSEPHINE PRESTON (MRS. L. S. MARKS) (1877-1922), American author; *b.* New York City. She was educated at Radcliffe College 1894-96. She was instructor in English literature at Wellesley College, 1901-03. She has written extensively in verse and prose and is the author of a number of dramas. Her publications include *Old Greek Folk-Stories*, 1897; *The Wayfarers*—a Book of Verse, 1898; *Marlowe*, a drama, 1901; *The Singing Leaves*, 1903; *The Book of the Little Past*, 1908; *The Piper*, a play that won the Stratford on Avon prize in 1910 and was produced in America in 1911; *The Wolf of Gubbio*, drama, 1913, and *Harvest Moon*, war poems, 1916. She has also contributed largely to magazines.

PEABODY MUSEUM. An institution belonging to Harvard University. It was named in honor of the philanthropist George Peabody (*q.v.*) who donated $150,000 as the foundation for a museum of archaeology and research. The funds of the museum have since been largely augmented by other donations. Under the auspices of the museum authorities in 1921-22-23, the ruins of northern Yucatan were explored and investigations were carried out in northern Guatemala and Honduras. George Schwab, an associate in Anthropology acquired for the museum a collection of ethnographic material from Southern Cameroon. Dr. Charles Peabody carried out investigations of ethnographic interest in France and Belgium. A collection of Burmese and Southern China curiosities was presented to the museum by Rev. E. Carrol Condict.

PEACE (59° N., 115° W.), river, Canada; rises in British Columbia, enters Great Slave River near Lake Athabasca.

PEACE CONFERENCES. (1) Of Paris. Preliminary arrangements made at Versailles by Interallied Council, which drew up Armistice terms. Further details arranged by representatives of Great Powers (Great Britain, France, U.S., Italy, and Japan) in Dec. 1918 and Jan. 1919. Twenty-seven allied and associated powers were invited to participate—viz., five Great Powers in addition to Brit. Dominions and India, Belgium, Brazil, China, Cuba, Greece, Guatemala, Haiti, Hejaz, Honduras, Liberia, Nicaragua, Panama, Poland, Portugal, Rumania, Serbia, Siam, Czecho-Slovakia, together with Bolivia Ecuador, Peru, and Uruguay. Delegates of five Great Powers entitled to attend all meetings of Conference and its committees; delegates of other powers entitled to attend only those sessions at which matters concerning them were discussed. Each of five Great Powers represented by five delegates; three each to Belgium, Brazil, and Serbia; two each to Australia, Canada, China, Greece, Hejaz, India, Poland, Portugal, Rumania, Siam, South Africa, and Czecho-Slovakia; one each to other powers—seventy in all. First plenary session of Conference held Jan. 1808, 1909, M. Clemenceau being chosen president, and M. Dutasta (French) secretary-general. Four vice-presidents also chosen, one from each of Great Powers (except Japan), who were also represented on the Secretariat-General of Conference. These officers, together with members of Committee on Credentials and Drafting Committee, formed bureau which was responsible not only for records but for general planning and organization of much of work. Each of commissions among which work of conference was subdivided had similar but simplified organization.

After formal opening of Conference on Jan. 18, it was decided that proceedings should be secret and no minutes kept. The body through which the Great Powers first functioned was the Council of Ten, but after Fr. press had boldly declared that an open rupture had occurred between the British and Amer. delegates, this council was superseded by the 'Big Four' (Lloyd George, Clemenceau, Wilson, and Orlando). Four plenary sessions were held up to May 7, on which day the completed draft of the treaty was handed to the Ger. delegates, but the main decisions were those of the Big Four. Serious deadlocks occurred

in April over the Fiume question (see ITALY), resulting in the secession of Orlando, and also over Japanese demand for statement in League of Nations Covenant affirming equality of all races. Nothing explains the delays and deadlocks of the Conference so obviously as the arguments over the League of Nations Covenant and the principle of self-determination—a cardinal feature of Wilson's 'fourteen points' (see WILSON), which was found to bristle with difficulties. Thus the deliberations were characterized by a strange conflict of new and untried theories with such age-old principles as the Balance of Power and 'Spoils to the Victor.' The covenant eventually found expression in first twenty-six articles of treaty. Much of the pioneer work that should in theory have been done by the League was in fact carried out by the Supreme Council.

To speed up matters commissions were appointed to work out details of constitution and function of League of Nations, Responsibility for the War, Enforcement of Penalties, Reparation for Damages, International Control of Ports, Waterways, and Railways. Other commissions created later included those on Economics, Finance, Belgium, Schleswig, Alsace-Lorraine, Poland, Czecho-Slovakia, Rumanian, Gr., and other territorial claims. A commission of inquiry inot the conditions of the employment of labor from the international standpoint was also set up, but most of its recommendations remained a counsel of perfection. These commissions prepared sections of the treaty dealing with the subjects specially assigned to them. The representation of the different powers on the commissions was not unattended with difficulty. A brief summary of the principal provisions of the treaty follows.

1. *Covenant of the League of Nations.*—See LEAGUE OF NATIONS.

2 and 3. *Boundaries of Germany, and Political Clauses for Europe.*—ALSACE-LORRAINE to be restored to France; ownership of coal mines in Saar Basin to be vested in France, and government of region to be entrusted for fifteen years to Commission of League of Nations; thereafter plebiscite as to future destination. No fortifications to be maintained or troops assembled in Germany W. of line 50 kilometres E. of Rhine.

Belgium gains full sovereignty over neutral territory of Moresnet, over part of Prussian Moresnet, and over (subject to plebiscite) the circle of Eupen and Malmedy. Annexation to Denmark of whole or part of that portion of Schleswig N. of line running somewhat S. of Flensburg, to be determined by plebiscite.

Germany cedes to Poland nearly all prov. of Posen and nearly all W. Prussia W. of the Vistula. Plebiscites for part E. of Vistula, and for most of Upper Silesia (excluding small part given to Czecho-Slovakia). Memel dist. subject to future disposition.

Danzig, with adjacent territory W. of the Nogat, a free city, Polish commerce being given special rights and privileges. Economic and political rights of inhabitants of ceded territories established by detailed provisions.

4. *German Rights and Interests outside Germany.*—Germany gives up all colonies and renounces all extra-territorial rights enjoyed against Allied and Associated Powers—*e.g.*, in Equatorial Africa under treaties with France, in China, Siam, Liberia, and Morocco. She recognizes Brit. and Fr. protectorates over Egypt and Morocco respectively. Shantung renounced to Japan.

5. *Military, Naval and Aerial Clauses.*—Ger. army limited to 100,000 men and officers; Ger. general staff dissolved; compulsory military service abolished; military training forbidden outside military schools necessary for permitted number of officers. Armaments and munitions definitely limited; poisonous gases, armored cars, and tanks not to be made; no importation or exportation of war material. Naval forces limited to 6 battle-ships, 6 light cruisers, 12 destroyers, and 12 torpedo boats. No submarines to be built or acquired; personnel of navy not to exceed 15,000. No fortifications to be maintained between North Sea and Baltic; fortifications and naval harbors of Heligoland and Dune to be destroyed. No air forces to be permitted. All military and naval aeronautical material, as well as all war and naval material of every kind, to be given up. Three Interallied Commissions of Control to supervise execution of these clauses.

6. *Prisoners of War and Graves.*—Provision made for repatriation of prisoners of war and identification of graves.

7. *Penalties.*—Five judges appointed by Great Powers to try Ger. emperor. All persons accused of war crimes to be given up for trial and possible punishment.

8. *Reparation.*—Compensation may be claimed for injuries to civilians through acts of war or maltreatment; for maltreatment of prisoners of war, naval and military prisoners, etc.; for forced labor; for destruction, injury, and seizure of non-military property; for fines and similar exactions imposed on civilians. Germany specially undertakes to pay 20,000,000,000 gold marks within two years, followed by 1,000,000,000 marks per year for five years, and then 2,400,-

000,000 marks per year (2,000,000,000 marks being regarded as interest on principal sum of 40,000,000,000 marks, balance being credited towards amortization). First payments must also be charged with expenses of maintaining armies of occupation and cost of necessary imports of food and raw materials, but are in addition to Germany's obligation to repay sums lent to Belgium by Allied governments and to restore property seized or sequestrated. Against these obligations Germany to be given credit on account of her mercantile marine, Saar coal mines, and other transferred public property. She must transfer all her ships over 1,600 tons, also many of her smaller vessels, and build ships for the Allied governments. Options are also given for delivery of coal, coke, coal-tar products, dyestuffs, and other chemicals. Large powers vested in Reparation Commission.

The remaining clauses deal with finance, economic questions, aerial navigation, ports, waterways, and railways, labor, guarantees, and miscellaneous questions. Elbe, Oder, Niemen, and Upper Danube (from Ulm) to be internationalized under control of commissions. Rhine to be controlled by joint commission. Kiel Canal to be open on equal terms to the trade of all nations at peace with Germany.

(2) Conferences Subsequent to Ratification of Treaty of Versailles by German Government, Jan. 1920. Ger. Government signed Peace Treaty, June 29, 1919, but by beginning of 1920 it was abundantly clear that, in many important particulars, she was not carrying out her treaty obligations, especially in matter of disarmament and reparation. Allies met on April 26, at *San Remo*, to deal with Germany's request, in face of great unrest and specially of seizure of Ruhr valley by communistic troops, for permission to maintain army of 200,000 instead of 100,000 according to treaty. Stern note, embodying statement of views as to Germany's shortcomings in respect to execution of treaty, sent in reply, declining to examine question until Germany showed she was honestly carrying out the treaty. Conference decided to summon Ger. delegates to Spa on May 25, for discussion of practical application of reparation clauses. It also dealt with Adriatic problem. (See ITALY). The general decisions at San Remo may be summarized as follows: Duty of restoring order in Ruhr valley to be left to Germans, who might, under guarantees, occupy district for suppression of rising. Declaration that Allies had no intention of annexing any portion of Ger. territory. This was necessary in view of Fr. press campaign urging annexation of Rhineland and coal measures. Delegates to be summoned to Spa to make definite proposals in regard to sums payable as reparation. Necessity for this step arose out of Germany's failure to comply with proposal embodied in letter of June 28, 1919, requiring that, within three months of signing peace, Germany should submit proposals in settlement of her liability as defined in Article 232. Mandates for Syria given to France; for Mesopotamia, including Mosul (subject to agreement with France as to oil distribution), to Great Britain; for Palestine, with full recognition as to the Balfour declaration in respect of Jews, to Great Britain. Pending signing of peace treaty with Turkey, the duty of guarding Dardanelles to be assigned to Great Britain; protection of Cilicia to France; of district of Adana to Italy. An appeal on behalf of Supreme Council to be made to U.S. to undertake mandate for Armenia; in event of refusal, Wilson to arbitrate as to boundaries. This was refused. A reaffirmation of decision previously arrived at, that trade relations should be opened up with Russia.

On May 15-16, 1920, as a kind of corollary to San Remo, Lloyd George and Millerand, acting for all the Allies, met at Hythe, and decided as follows: Treaty of Versailles to be enforced in all its details, especially disarmament clauses. Experts to be appointed for purpose of (*a*) preparing porposals for fixing minimum total of Ger. debt, compatible with her capacity to pay; (*b*) methods of payment and of capitalization of said debt to be determined in manner best calculated to ensure Germany's restoration to financial automomy by speedy fulfillment of her obligations; and (*c*) proportionate divisions between Allies of payments to be made by Germany. Further, it was agreed that Allied indebtedness to Great Britain should be paid off *pari passu* with Germany's payments.

After more than one postponement, *Spa Conference* met in June 1920—the first occasion on which Ger. representatives met Allies in unfettered discussion. General impression left on minds of Allies was that the Ger. chancellor and Herr von Symons, his colleague, were perfectly honest men, doing their best to cope with the gigantic task of carrying out the treaty. Decisions arrived at were as follows: in distribution of reparation funds Brit. interests to get 22 per cent.; France, 50 per cent.; Italy, 10 per cent.; remainder to Belgium and other Allies. The 2,000,000 tons of Ger. shipping surrendered to Great Britain since the Armistice to be sold, and proceeds, together with freights earned, to be credited first to cost of Brit. army of

occupation, and secondly, to Brit. share of reparation, including advances to Belgium. Germany undertook to deliver 2,000,000 tons of coal to the Allies per month, 1,500,000 tons to go to France. On this matter the Conference nearly broke down. The treaty provided that in fixing Germany's contribution of coal, Allies should take into account needs of Ger. industry. The question for Germany was whether she should be credited with export price or inland price; if latter, her only means of buying food would be taken from her. Allies stipulated that difference between two prices, as to five marks per ton, should be paid in cash to Germany, and balance advanced to her for purpose of buying food and clothing for the miners. As to the indemnity, Germany submitted schemes for arriving at the amount, and enabling her to liquidate her obligations; whereupon Allies decided to appoint small commission of experts to discuss schemes with the Germans in detail. As to punishment of war criminals, Allies realized that Germany was not solely to blame for delay. Naval disarmament was considered satisfactory, but the delay in military disarmament, notably in matter of surrender of rifles, was considered a grave menace, 600,000 rifles being in possession of the Einwohnerwehr (civil guards).

In regard to *Turkey*, Allies decided to adhere substantially to terms already submitted to that country, with one important alteration—viz., that Turkey should have a representative on the Straits Commission. Just before the Conference, nationalists under Mustapha Kemal (see also TURKEY) had broken out in rebellion, and small Brit. force at Ismid was threatened. Venizelos agreed to dispatch Gr. army to Smyrna to restore order. Turkey was given ten days in which to sign treaty of peace. The war between Poland and the Russian Bolsheviks came up for consideration, and the conference decided Allies must stand by Poland. This decision was communicated to Russia, and Lenin and Trotsky replied with evasive propagandist document intimating willingness to negotiate directly with Poland, but declaring that they were prepared only to discuss Polish boundaries with a proletarian government. Reply regarded as profoundly unsatisfactory, and France and Great Britain at once sent special envoys to Poland to report as to steps necessary to enable Poles to defend their territory.

The years following the conclusion of were marked by a steady succession of conferences relating to the important questions issuing from the war and from the terms of the peace treaty. Some of these conferences related to the payment of reparations by Germany, others to economic conditions in Europe, and still others to a reduction of armament and attempts to bring about agreements between the countries still at war. An important conference of the allied prime ministers was held in Paris from January 24 to 29, 1921. For further discussion of the reparations question and German disarmament, see REPARATIONS. This was followed by a conference in London on February 28 on the same subject.

The most important conference of 1921-22 was the Washington Conference on the Limitation of Armaments. See CONFERENCE ON THE LIMITATION OF ARMAMENTS. This was followed by a conference at Genoa, the chief purpose of which was to bring about some form of agreement with Russia. The aggressive attitude taken by the Russian delegates and their impossible demands for recognition forced the abandonment of the conference without any definite results. An attempt to readjust the difficulties resulted in a second conference at Brussels, which had little more result. The League of Nations continued to meet during these years and its work will be found discussed in the article LEAGUE OF NATIONS.

The most important conferences of 1923 were those carried on between the English, Belgian and French governments in regard to the failure of Germany to pay reparations, and the two conferences at Lausanne held with the object of bringing about permanent peace between Turkey and Greece. See REPARATIONS; LAUSANNE, CONFERENCE OF.

PEACE ENDOWMENT. See CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE.

PEACE MOVEMENT. Peace congresses began in 1843, and were held in different countries in rotation. The tendency to submit various international questions to arbitration increased, but these were not basic to national freedom, safety, honor. In 1899, however, the Tsar Nicholas II. suggested an international meeting at the Hague which should attempt to abolish war. Peace conferences were held there in 1899 and in 1907, and conventions were drawn up and signed by various powers, but they had no real sanction. Great Britain agreed to chief conventions (*i.e.*, that arbitration should be accepted in international disputes, and that laws of war by land and sea should be ascertained and insisted on), but not to declarations against the use of asphyxiating gases and expanding bullets; a proposal for the reduction of armaments was not carried, being regarded with disfavor by Ger-

many and other powers. The most important conclusions regarded the definition of contraband of war (see DECLARATION OF LONDON). In 1910 Mr. Andrew Carnegie placed sum of $10,000,000 in hands of trustees to be used for abolishing war. Germany's deliberate initiation of the Great War showed that civilization was still exposed to perils of destruction. But her action profoundly stirred the universal conscience, and in President Wilson's phrase, 'to make the world safe for democracy' became the peace aim of the Allied and Associated Powers. With this object the Covenant of the League of Nations was embodied in the Peace Treaty of Versailles, 1919. See LEAGUE OF NATIONS; ARBITRATION, INTERNATIONAL.

PEACH (*Prunus Persica*), rosaceous tree grown for its fruit; allied to apricot, cherry, plum, and almond; best reared in shelter of old wall, facing south-east; requires deep, well-drained soil containin calcareous matter, which may be supplied in form of old mortar or lime. If soil is on light side, a judicious addition of loam will improve it, while plenty of vegetable manure is also beneficial. Normally the p. is grafted on to a hardier stock, mussel plum or almond being generally used, although other stocks are used for the most susceptible varieties.

PEACOCK. See under PHEASANT FAMILY.

PEACOCK, GEORGE (1791-1858), Eng. mathematician; largely instrumental in introducing to Cambridge continental calculus notation and methods, and in founding Cambridge Philosophical Soc.

PEACOCK, THOMAS LOVE (1785-1866), Eng. writer; friend of Shelley, who persuaded him to abandon business for letters and aided him financially; eventually obtained government post; f.-in-law of George Meredith. Poems include *Palmyra, Philosophy of Melancholy,* and *Rhododaphne*; his best novels are *Melincourt, Nightmare Abbey,* and *Maid Marian.* Edited by Prof. Saintsbury, 1895.

PEALE, CHARLES WILLSON (1741-1827), noted Amer. portrait painter; *f.* of Rembrant Peale, 1778-1860, also a painter.

PEALE, REMBRANDT (1778-1860), American painter and author; *b.* Bucks County, Pa. His *f.* was an eminent artist, and young Peale studied art under his direction. He engaged in portrait painting in Charleston, S. Car. in 1796 and in 1801 went to London where he studied under West, returning to the United States two years later. Twice in the next six years he visited Paris, returning to this country in 1810 and carrying on his portrait painting in Philadelphia, New York, Charleston and Baltimore. He visited France and Italy in 1829, and in 1833 settled in London where he remained for many years. He painted several portraits of Washington, one of which was bought by Congress. His drawing was remarkably accurate, but he fell short in the matter of color and his style was more distinguished for refinement than vigor. In addition to his paintings he excelled in lithography. Among his more notable works are *The Roman Daughter,* 1810; *The Court of Death,* 1920 and *The Ascent of Elijah,* besides portraits of Thomas Jefferson, Cuvier, Houson, Gilbert Stuart and Mrs. Madison. His publications include *An Account of the Skeleton of the Mammoth,* 1802; *Notes on Italy,* 1831; *Graphics,* 1841 and *Reminiscences of Art and Artists,* 1845.

PEANUT, an annual plant which grows abundantly in warm climates. Its flowers above the ground are sterile and the pods are stocked oblong and cylindrical about one inch in length. After the flower withers the stalk and the ovary elongates itself and bending down, forces the young pod under the ground. Thus the seeds reach maturity at some distance below the surface. The peanut is extensively cultivated in all tropical and sub-tropical countries, especially in the United States, Africa, India and China. The pods, when ripe, are dug up and dried. When roasted the nuts are sweet and palatable. Vast quantities are used for eating and in confectionery and the manufacture of peanut butter. The nuts yield an excellent substitute for olive oil.

PEANUT OIL, a yellow oil with the characteristic odor and flavor of peanuts, from which it is obtained by pressure. It is much used in the manufacture of soap and after being refined is also used as a salad oil and for cooking purposes.

PEAR (*Pyrus communis*), member of Rosaceae, indigenous to temperate Europe; cultivated for its fruit (known botanically as a pseudocarp, the edible portion representing the enlarged apex of the receptacle, whilst the fruit proper constitutes the core); requires a deep, fairly moist, clayey loam with good drainage, and a southern outlook.

PEARCE, WILLIAM (1862), Anglo-American bishop; *b.* Hayle, Cornwall, Eng. He was educated in the latter country, came to America in 1884 and

was ordained to the ministry of the Free Methodist Church in 1888. He held pastorates at Corralitos, Cal., 1889-90 at Ione, 1891; at San Jose, 1892-93; at Alameda, 1893-95; and again at Ione, 1906. He was presiding elder in various California and New York districts, 1897-1907 and in 1908 was chosen bishop. He has been president of the General Missionary Board and in 1910 was a delegate to the World's Missionary Conference at Edinburgh, Scotland.

PEARL, globular concretion found in shells of certain bivalve molluscs; highly valued for ornamental purposes, and classed among gems. Most molluscs line their shells with a smooth secretion consisting of thin scale-like films. If a particle of foreign matter—say a grain of sand—finds its way into the interior of the shell, it sets up irritation, and as the inhabitant of the shell cannot remove offending particle it surrounds it with a layer of nacreous matter. The longer this process continues, the larger of course will be the globule of nacre, which is known as a p. The principal sources of p's are the p. oyster (*Meleagrina margaritifera*), found throughout the Pacific; p. mussel (*Avicula margaritifera*), and freshwater mussel (genus *Unio*) of Brit. rivers.

The chief p. fisheries are those of Ceylon, carried on principally in the Gulf of Manaar. Those of the Persian Gulf were known to the ancients. P's are also obtained from the Sulu Archipelago, N.E. Borneo, New Guinea, Gulf of Mexico, and Australia. Native divers descend 60 to 70 ft., weighted by a stone and lowered from a boat by a rope. They carry a net and gather the p. oysters in it from the sea-floor. They remain below for perhaps 30 to 40 seconds at a time, and are hoisted to surface after signalling with a rope. The oysters are allowed to rot on the beach in sun's rays. Then in 7 or 10 days they are searched for p's.

PEARL HARBOR, port, Oahu, Hawaiian Islands (21° 30′ N., 157° 30′ W.), 6 m. W. of Honolulu; landlocked harbor, with narrow entrance guarded by coral reef. Attention has been directed to its utilization as a coaling station since 1884. In 1909, U.S. government announced that repair shops and dry dock would be constructed and extensive fortifications undertaken. These were completed in 1920.

PEARSE, PATRICK H. (1880-1916), *b.* Dublin; associated from his earliest years with the literary side of the extreme Nationalist movement; founded the New Ireland Soc., 1897; was elected to the executive of the Gaelic League and ed. its weekly journal. On the outbreak of the rebellion, 1916; he became 'Commandant-General of the Army of the Irish Republic and President of the Provisional Government,' and was one of the signatories of the declaration of the Irish Republic; held out against government troops for a week, then surrendered unconditionally; was tried by court-martial, and executed (May 3, 1916). Since his death, his *Collected Works* have been pub. in two vols. (1917 and 1918), chiefly plays and poems, remarkable for literary beauty.

PEARSON, SIR ARTHUR (1866), Eng. publisher and philanthropist; founder and chairman of C. Arthur Pearson, Ltd.; proprietor of various newspapers until failure of sight; president National Institute for the Blind, and Fresh Air Fund; vice-president Tariff Reform League, and vice-chairman Tariff Commission, 1903; joint hon. secretary National Relief Fund, 1914; chairman Blinded Soldiers' and Sailors' Care Committee, 1914; he founded St. Dunstan's, for blinded soldiers.

PEARY, JOSEPHINE DIEBITSCH, Artic traveler; *b.* in Washington, educated at Washington. A member of Robert Peary's expeditions in 1891-92 and 1893-94 to Greenland and was the first white woman to winter with the expedition. In 1900 went to meet husband but the ship was caught in the ice at Cape Sabine, 78° 42′ N. Lat. Author of *My Arctic Journal*, 1894; *The Snow Baby*, 1901; *Children of the Arctic*, 1903.

PEARY, ROBERT EDWIN (1856-1920), American Arctic explorer and discoverer of the North Pole; *b.* Cresson, Pa. He graduated at Bowdoin College in 1877 and entered the United States navy in 1881 as a civil engineer with the rank of lieutenant. Much of his work for the next four years was connected with the surveys for the Nicaragua Canal. His first entry on the field in which he became famous took place in 1886, when he went on an exploring expedition to Greenland. In 1891 he headed an Arctic expedition under the auspices of the Philadelphia Academy of Natural Sciences and made a remarkable sledge journey of 1,300 miles across Greenland from McCormick Bay to Independence Bay, discovering Melville Land and Heilprin Land, and making certain what had formerly been only surmised that Greenland was an island. In the course of the next ten years he made several other Arctic trips, achieving results of the greatest value to geographical and meteorological science and bringing back the records and instruments of the ill-fated Greeley

expedition. In 1902 he had reached a point as far north as latitude 84° 19′ before he had to abandon his hope of reaching the Pole at that time. Another trip in 1906 enabled him to get within 203 miles of the Pole. But on July 6, 1908 he embarked on the expedition which was to crown his persistent efforts with success, and on the 6th of April, 1909 he at last reached the North Pole. His triumph was clouded by the claims of a prior discovery made by Dr. Frederic Cook, and a long controversy ensued that clearly established the validity of Peary's claim. Honors were showered on him by the learned societies of the world and on March 3, 1911 he received the thanks of Congress and was promoted to the rank of rear admiral. His publications include *Northward Over the Great Ice*, 1898; *Nearest the Pole*, 1907; *The North Pole*, 1910 and *Secrets of Polar Travel*, 1917.

PEASANTS' WAR.—In 1524, the peasants of the Black Forest, Germany, banded together and rose against the nobles. The revolt rapidly spread through the S. of the country. They demanded in twelve articles the right to elect their own ministers, to be allowed to kill wild game and to fish, and the reduction of the villein service. In Thuringia the peasants were exceedingly determined and violent. The army of the Swabian League defeated them at Leipheim in 1525, and over 100,000 were killed.

PEAT, remains of bog-moss, *Sphagnum*, together with partially preserved remains of vegetation swamped and killed by its overgrowth; owes its preservative power to presence of humic acid. P.-bogs are found in many parts of England, are more common in Scotland, and still more numerous in Ireland. Various attempts have been made to compress p., and so make it commercially available as fuel, but no satisfactory system has yet been produced.

PEATTIE, ELIA WILKINSON (1862) an American journalist and author, *b.* at Kalamazoo, Mich., *d.* of Frederick and Amanda Cahill Wilkinson. She married Robert Burns Peattie, a journalist, of Chicago, in 1883. She was a reporter on various Chicago dailies and wrote short stories until 1888 and then became an editorial writer for the Omaha World-Herald, after which she was a literary critic for the Chicago Tribune from 1901-17. Author: *With Scrip and Staff*, 1891; *The Edge of Things*, 1904; *Edda and the Oak*, 1911; *Azelea*, 1912; *Annie Laurie and Azelea*, 1913; *The Precipice*, 1914; *Lotta Embury's Career*, 1915; *The Newcomers*, 1916, and others.

PECCARY (*Dicoityles*), a genus and family of Swine, with five species confined to the New World, in the forests of which they wander in large herds.

PECHORA (65° N., 57° E.), river, N.E. Russia; rises in Urals, flows into Gulf of P.

PECK, a measure for dry goods—the fourth part of a bushel.

PECK, ANNIE SMITH, a mountain climber, *b.* at Providence, R. I., *d.* of George Bacheler and Ann Power Smith Peck. She was educated at the University of Michigan and was the first woman to study in the American School of Classical Studies, Athens. She was a teacher for several years in various schools, colleges and universities, including professor of Latin at Smith College, and after 1890 gave public lectures with stereopticon, on Greek archaeology, travel and Alpinism. She was also a distinguished mountain climber, one of her most notable ascents being up Mt. Huascaran, Peru, to the summit of north peak, Sept. 2, 1908, first ascent, 21,812 ft. the highest point in America yet attained, 1920 by any American. Author: *Commercial and Industrial South America*, 1922.

PECK, SAMUEL MINTURN (1854), Author; *b.* at Tuscaloosa, Ala. In 1876 graduated from the University of Alabama. Wrote many short stories, fiction and novels. Among his well known songs are *Grape Vine Swing* and the Yale College Song, *The Knot of Blue*. Author of (poems) *Cap and Bells*, 1886; *Rings and Love Knots*, 1892; *Rhymes and Roses*, 1895; *Fair Women of Today*, 1896; *The Golf Girl*, 1899; (fiction) *Alabama Sketches*, 1900; *Maybloom and Myrtle*, 1910; *Swamp Tales*, 1912.

PECK, TRACY (1838-1921), American educator; *b.* Bristol, Conn. He graduated at Yale in 1861 and later pursued special studies along classical lines in Germany. He held the chair of Latin at Cornell University, 1871-80, and was professor of the same language at Yale from 1880 till 1908. He held the presidency of the American Philological Association, 1885-86, and in 1898-99 was director of the American School of Classical Studies in Rome. Apart from collaboration with other scholars in the publication of many annotated Latin texts and numerous contributions to linguistic magazines, he published *The Authorship of the Dialogus de Oratoribus*, 1879; *Alliterations in Latin*, 1885; and *Cicero's Hexameters*, 1897. In 1908 he took up his residence in Rome.

PECKHAM, JOHN (*d.* 1292), Eng. Churchman; lectured at Paris and Ox-

ford; adp. of Canterbury, 1275; generally on good terms with Edward I., but a vigorous defender of Church.

PECKHAM, RUFUS WILLIAM (1838-1909), American jurist; *b.* Albany, N. Y. He studied law and was admitted to the bar in 1859. He became district attorney of Albany County in 1868 and served three years, following which he resumed private practice and had charge of many important cases. He was chosen corporation counsel of the city of Albany in 1881. His politics were Democratic, and he took an active part in the councils of his party. From 1883 to 1886 he was justice of the New York Supreme Court; became associate justice of the State Court of Appeals, 1886-95, and in the latter year was elevated to the bench of the Supreme Court of the United States. In that position he rendered many notable opinions. His tendency was toward conservatism and this is reflected in his decisions.

PECORA, COTYLOPHORA, the Pecora, or true Ruminants, a group of Artiodactyle Ungulates, include deer, giraffe, cattle and sheep. The name *Cotylophora* refers to the connection between the unborn young and the mother, the two being connected by patches of small villi or finger-like processes.

PECOS RIVER, stream that rises in the Rocky Mountains in San Miguel county, New Mexico, and runs in a southeasterly direction through extensive arid table lands almost wholly destitute of forests. It enters Texas at an altitude of 32° N. and longitude 104° W. and joins the Rio Grande in Valverde county. Its total length is about 800 miles, and through most of its course it is extremely shallow. It has a drainage area of 32,000 square miles. The Reclamation Service has established two reservoirs in the vicinity of Hondo and Carlsbad, New Mexico which provide for the irrigation respectively of 10,000 and 20,000 acres.

PÉCS, FÜNFKIRCHEN (46° 6′ N., 18° 13′ E.), town, Hungary; bp.'s see; cathedral; held by Turks, 1543-1686; woolens, porcelain. Pop. 1910, 49,822.

PEDAGOGY, the science of education, especially as applied to the development of the child mind. The founder of the science was Pestalozzi. Before his time, and for long after, the education of children consisted simply in learning by rote as large a quantity of assorted facts as it was possible to memorize. That system is by no means dead yet, but since the period covered by the American Revolution, during which Pestalozzi conducted his experiments in Switzerland, there has been a steady progress in methods of education. The science of pedagogy rests on the assumption that it is not enough to present knowledge to the developing mind of a child, but to train the reasoning powers as well. As is demonstrated by the systems of education followed by many narrow church bodies, the mere presentation of facts to an undeveloped mind has the effect of crystalizing that mind so that the facts or dogmas implanted are accepted unquestionly and the reasoning powers are stunted. In the earlier stages of education less and less significance is attached to the actual imparting of knowledge, and more to the training of the powers of the mind, the pursuit of knowledge being left in a large measure to later years, when the mind is capable of acquiring and weighing facts for itself. The development of modern psychology has brought a parallel development in the field of pedagogy, almost giving it a new starting point, since it has brought a realization that no system of teaching can be formulated which is adaptable to the teaching of all children. This phase of modern education has as yet made little popular headway, but its future application on a general scale will see children of similar ages divided into classes, each class taught by a different method, suited to the temperamental needs of that class of children.

PEDEE RIVER, GREAT AND LITTLE, two rivers in the United States. The Great Pedee rises in North Carolina, flows through South Carolina, and falls into the Atlantic Ocean. It has a total length of 360 miles, of which about 200 miles is navigable. The Little Pedee rises also in North Carolina, and enters the Great Pedee, 32 miles from its mouth.

PEDAL, the name given to a lever worked by the foot in various musical instruments, also on a bicycle, etc. The organ has a pedal keyboard of several pedals; the English piano usually only two ('loud' or 'damper,' and 'soft'); whilst the harp has seven foot levers to raise the pitch of the notes.

PEDICULOSIS, condition in which lice (*pediculi*) are present on the head, body, or pubes.

PEDIGREE. See GENEALOGY.

PEDIMENT, the triangular space over the portico at the ends of the roof of classic buildings. It is enclosed by the horizontal and the *raking* cornices, the latter of which follow the slopes of the roof. The P. may be called the gable of classic buildings. It is fre-

quently enriched with sculpture, for which it forms a fine setting. The doors and windows of classic buildings are often surmounted by P's, either straight-sided or curved.

PEDOMETER, as its name implies, is an instrument which indicates the distance walked. Shaped like a watch and carried in the pocket, it is so constructed that when the body is raised by the spring of the foot then a lever acts upon the wheels and an index-hand indicates on a dial plate the number of paces (usually) or the number of miles (more rarely and less accurately) travelled. A hodometer is a similar instrument for indicating the distance travelled by any wheeled vehicle. Since the mechanism is worked by the revolution of the axle, it is obviously more reliable than a P. A cyclometer is another form used on bicycles.

PEDRO I., DON ALCANTARA (1798-1834), Emperor of Brazil, *b.* at Lisbon; the second *s.* of John VI. of Portugal and Charlotte Joachima, *s.* of Fredinand VII. of Spain. He became heir-presumptive to the throne of Portugal by the death of his *b.* Antonio. In 1807, when Napoleon's troops under Junot invaded Portugal, Don P. and the rest of the royal family went to Brazil under British protection. In 1817 he married Leopoldina, Archduchess of Austria, *d.* of the Emperor Francis I. On his father's return to Portugal in 1821 he became prince-regent of Brazil, and declaring for Brazilian independence, was crowned emperor in 1822. In 1831 he abdicated in favor of his son and returned to Europe, and succeeded in deposing his brother Miguel from the throne of Portugal.

PEDRO II., DE ALCANTARA (1825-91), Emperor of Brazil, *b.* at Rio de Janeiro. His father, Pedro I., abdicated in his favor in 1831, and, after a regency, he was crowned in 1814. He ruled with much tact and judgment, but was forced to abdicate in 1889.

PEEBLESSHIRE (55° 35′ N., 3° 20′ W.), inland county, Scotland, bordered on N. by Edinburghshire, on W. by Lanarkshire, on S. by Dumfriesshire, on E. by Selkirkshire; area, 348 sq. miles; country rough and hilly, rising to 2745 ft. (Broad Law); agriculture and sheep-farming are pursued; coal is mined, while wool-manufacturing is an important industry. Pop. 1921, 15,330.

PEEKSKILL, a village of New York, in Westchester co. It is on the New York Central Railroad, and on the Hudson River. Its industries include the manufacture of fire brick, stoves, underwear and hats. It is notable for the picturesque mountain scenery which surrounds it. The town has a military academy, several private schools, and is the site of the New York State military camp. Pop. 1920, 15,868.

PEEL, ARTHUR WELLESLEY, VISCOUNT PEEL (1829-1912), Brit. Liberal statesman; *s.* of Sir Robert P.; elected Speaker, 1884, 1886, 1892; cr. viscount on resignation, 1895; chairman of Commission of Licensing Laws, 1896.

PEEL, SIR ROBERT, BART. (1788-1859), Brit. statesman; Home Sec., 1822, with Liberal Canning as Foreign Sec. and chief influence; disliked Canning's assistance of revolution abroad and support of Catholic emancipation at home; with Wellington and Eldon, resigned when Canning became First Lord of Treasury, 1827. Canning died the same year, and Wellington formed a purely Tory ministry in which P. was again Home Sec.; member for Tamworth, 1833-50; led opposition in ministries of Grey, 1832-34 and Melbourne, 1834. He became Prime Minister, Nov. 1834; was forced to resign, April 1835. Conservatives returned, 1814, with P. as Prime Minister. He restored order in finances, imposing Income Tax. Famous Free Trade measures, 1842, show new strength of manufacturing as opposed to landed interest; great Irish agitator O'Connell imprisoned; revolts in India crushed and Sind annexed; retired before new Liberal wave, 1846.

PEELE, GEORGE (*c.* 1558-*c.* 1597); Eng. dramatist; wrote *Arraignment of Paris,* 1584, a masque; *Old Wives' Tale,* 1595; one of pioneers of great blank verse outburst.

PEELE, JOHN THOMAS (1822-97); Anglo-American artist; *b.* Peterborough, Eng. He came to the United States at an early age, established himself as a portrait and genre painter in New York and through the excellence of his work was made a member of the National Academy. He returned to England in 1851 and remained there until his death. Among his paintings may be cited *Music of the Reeds,* 1857; *Highland Supper, Village School, A Bit of Gossip* and *The Bird's Nest.*

PEERAGE. It might be defined as consisting of the temporal members of the House of Lords, spiritual lords of Parliament being no longer considered to be peers, and life peers having no right to legislate *ex honore.* Term 'peers' (*pares*) first used in its special sense in Act of 1322.

In England, as in France, tenants-in-chief, or 'barons,' did sit at the lords',

that is, the king's court, and chief barons acquired title of peers. Stubbs fixes 1295 (Edward I.) as the tine 'from which the regularity of the baronial summons is held to involve the creation of a hereditary dynasty, and so to distinguish the ancient qualification of barony by tenure from that of barony by writ.'

The peerage is divided into successive ranks of duke, marquess, earl, viscount, baron, possessing the same privileges and divided only by order of precedence. The family of a peer do not share his privileges and are not considered to have 'nobility of blood.' No claim can now be made to *peerage* on plea of barony by tenure; baronies are either by writ or (more usually) letters patent, but writ to ancestor is not sufficient proof of right to barony if it cannot be established that he actually sat in Parliament as baron by writ.

The first creation of barony by patent was 1387. Earls existed before the Conquest, though the legal status of dignitaries holding that title is obscure, as is that of immediate post-Conquest earls. The earl took a baronial character under the feudal system, and represented the highest rank in the peerage until dukedom was created, 1337 for the king's son. The first marquessate created in 1385; first viscounty in 1440. The crown has the prerogative of creating peers. Peeresses are either so *jure suo*, by descent or creation, or as wives of peers, and have, like peers, the right to appear before no law court but House of Lords, but have not right to sit in the House of Lords. Life peers —*i.e.*, lords of appeal who sit as assessors with judicial functions—were first created in 1876.

PEGASUS (classical myth.), winged horse which sprang from the slain Medusa's blood; Bellerophon mounted him and slew the Chimaera.

PEGMATITE, coarse granite rocks occurring in veins in diorites, gabbros, and syenites, and associated with plutonic and intrusive rocks; irregularly composed of alkalies, felspar, and quartz; irregularly distributed; some varieties rich in mica; used in porcelain manufacture.

PEGNITZ (49° 27′ N., 11° 10′ E.), river, Bavaria; unites with Rednitz at Fürth to form the Regnitz.

PEGU.—(1) The capital of Pegu dist., Lower Burma, stands on the river of the same name, 45 miles N.E. of Rangoon. The town was founded in the latter half of the VI. cent. A.D., and rose to a position of great importance in the XVI. and XVII. cent's, and there is a fine pagoda still remaining. P. became British, in 1852. Pop. 14,000. The district has an area of 4,275 sq. miles, with a pop. of 350,000. (2) A river of Lower Burma; has a length of 180 miles. It has its source in the Pegu Yoma Mts., and flows S.S.E. and S.W. to join the Rangoon River.

PEINE (52° 19′ N.; 10° 12′ E.), town, Hanover, Prussia; ironworks. Pop. 18,000.

PEIPUS, CHUDSKOYE OZERO (58° 35′ N., 27° 30′ E.), lake, Russia; discharges by Narova into Gulf of Finland; connected on S. with Lake Pskov; area, 1356 miles.

PEIRÆUS, PIRÆUS (37° 45′ N., 23° 10′ E.), town, Greece, on Saronic Gulf; the port of both ancient and modern Athens. Pop. 71,600.

PEIRCE, BENJAMIN (1809-80), American educator and mathematician; *b.* Salem, Mass. He graduated at Harvard in 1829, became tutor in that institution in 1831, professor of mathematics and natural philosophy, 1833-42, in the latter year being made Perkins professor of mathematics and astronomy, a chair that he held till his death. Apart from his college duties, he was active in many scientific fields in which his labors gained him an international reputation. He was superintendent of the U. S. Coast Survey, 1867-74, and conducted and organized many important expeditions. He was an honored member of many of the most famous scientific societies in the world, and his contributions to astronomy and mathematics have been of great and enduring value. Apart from many textbooks, his publications include: *Analytic Mechanics*, 1855, *Linear Associative Algebra*, 1870, and *Ideality in the Physical Sciences*, 1881.

PEIRCE, WILLIAM FOSTER (1868), College President; *b.* at Chicopee Falls, Mass. In 1888 graduated from Amherst College. At Ohio University from 1891-92 as professor of psychology and pedagogy. In 1892-96 professor of psychology and ethics and since 1896 president of Kenyon College. In 1901 he was ordained a minister of the Protestant Episcopal Church.

PEISISTRATUS (*c.* 600-527 B.C.), tyrant of Athens; relation of Solon; of great wealth and influence. Pretending to have been attacked and wounded by Eupatridae (*q.v.*) for upholding democracy, he gradually increased the armed guard assigned him by the indignant populace, and at last seized the acropolis, 560; expelled by Lycurgus and Megacles,

559; restored by Megacles, 554; again expelled, 552; remained in exile till 514. Returning with an army P. ruled till 527, when his sons Hippias and Hipparchus succeeded him.

PEIXOTTO, ERNEST CLIFFORD (1869), American artist and author; *b.* San Francisco, Cal. He studied art in the San Francisco School of Design and later at Paris, where he exhibited at the Salon in 1890-91. For several years he alternated between the United States and France, receiving honorable mention for his drawings at the Chicago World's Fair and also receiving honorable mention at the Paris Salon in 1895 for his *A Woman of Rijsoord*. He settled in New York in 1897 and achieved a marked reputation as illustrator for magazines. Following a trip to Europe in 1899, he wrote impressions of his travels and accompanied them with pictures. The success he met with caused him later to confine his illustrations to his own publications. Exhibitions of his works were given in New York in 1906-07, and at Chicago, Detroit and Toledo, 1907-08. His architectural drawings and mural paintings have augmented his reputation. His publications include *By Italian Seas*, 1906; *Through the French Provinces*, 1909; *Romantic California* 1911; *Pacific Shores from Panama*, 1913; *Our Hispanic Southwest*, 1916; *A Revolutionary Pilgrim*, 1917 and *The American Front*, 1919.

PEKIN, a city of Illinois, in Tazewell co., of which it is the county seat. It is on the Cleveland, Cincinnati, Chicago and St. Louis, the Chicago and Alton, the Illinois Central, and other railroads, and on the Illinois river. Its industries include the manufacture of agricultural implements, wagons, foundry products, etc. It is the center of an extensive coal mining and agricultural region and has an important commerce by rail and water. Its public buildings include a library, court house and government buildings. Pop. 1920, 12,086.

PEKING, cap. of China (39° 53′ N., 116° 29′ E.), between Peiho and Hun-ho, Chi-li prov. It consists of two cities, each surrounded by high walls with numerous towers and gates. The Tatar or Manchu city in N. includes Hwang-cheng (old imperial city), with military arsenal, public offices, univ., astronomical and magnetic observatory (founded 13th cent.), residences of nobles, etc., and Tsze-kin-cheng (Forbidden City), with palaces and parks. The Chin. city on S. has Temple of Heaven and Agriculture, warehouses, theatre, etc.; summer palaces, several temples, and convents within vicinity. City is connected by rail with Kalgan, Tien-tsin, Hankow, and Mukden. Peking was imperial cap. under various names for centuries; siege of foreign legations, during which many fine buildings were destroyed, 1900. Pop. 1,000,000.

PELAGIA, ST. (*c.* III. cent.), virgin martyr, whose historicity has been doubted.

PELAGIUS I., pope, 555-61; elected owing to influence of Emperor Justinian. —Pelagius II., pope, 579-90; tried to settle disputes existing since P. I.

PELAGIUS (*c.* 360-420 A.D.), heresiarch founder of heresy called Pelagianism. For most of his life P., who was of Brit. birth, was reputed orthodox and was the friend of St. Augustine. The controversy in which he engaged with Augustine centred round original sin, which the Eastern Church had tended to minimise. P.'s religious experience was less stormy than Augustine's, and his religion, therefore, tended to develop into an ethical moralism, and did not emphasise the necessity for Divine grace. It was possible, according to him, to lead a sinless life. The controversy began in 410, and became acute in 419. P. is not heard of after 420. Pelagianism has appeared since in Christian doctrine, but has never given rise to a formal sect.

PELARGONIUM, genus of plants, order Geraniaceae; the beautiful garden p's are hybrids. See GERANIUM.

PELASGIANS, people mentioned in *Iliad* as allies of Troy, and in *Odyssey* as a Cretan tribe; thought to have inhabited Thessaly, and by Herodotus to have preceded the Hellenes as inhabitants of Greece. A legendary King Pelasgus was at Argos. All the early population—pre-Mycenaean—of Greece and Rome is sometimes called Pelasgian. See GREECE (History).

PELÉE, MONT, an active volcano in N.W. Martinique, W. Indies. It was in eruption in 1762, 1851, 1902, and 1906. Previous to 1902 the summit (Morne de la Croix) reachec 4300 ft., but after the eruptions of that year a giant obelisk of rock, about 1000 ft. high, was forced out through the crateral dome on the S.W. side. The eruption of May 8, 1902, completely destroyed the town of St. Pierre and caused the death of about 30,000 people, and that of Aug. 30, 1902, partially destroyed Morne Rouge and killed about 2,000.

PELEUS, in Greek legend, *s.* of Aeacus and Endeis, *b.* of Telamon, and king of the Myrmidones at Phthia. Together with Telamon, he was banished for the

murder of Phocus, and fled to Eurytion, king of Phthia, in Thessaly, who gave him his *d.* Antigone to wife with a third of the kingdom as dowry.

PELEW ISLANDS (7° N.; 134° 13′ E.), group of small mountainous islands, W. Pacific, belonging to Germany. Pop. 3,000.

PELHAM, GEORGE (1766-1827), bp. of Bristol, 1803; of Exeter, 1807; of Lincoln, 1820; *s.* of Earl of Chichester.

PELHAM, HENRY (1696-1764), Brit. Prime Minister; *b.* of Duke of Newcastle; formed ministry, 1745, united all shades of Whigs; ended war, 1745; blind to signs of European coalition against Britain.

PELHAM, JOHN DE (*d.* 1429), Eng. Lord Treasurer, 1412-13; one of first prominent members of this family; aided Henry IV. to secure throne.

PELHAM, JOHN THOMAS (1811-94), bp. of Norwich, 1857-93; *s.* of Earl of Chicester; friend of Cardinal Manning.

PELHAM, SIR WILLIAM (*d.* 1587), Lord Justice of Ireland, 1579; ruthlessly stamped out Desmond revolt in Munster; marshal in Netherlands, 1581-87.

PELICANS (*Pelecanidoe*), family of swimming birds with four webbed toes, found near lakes and swamps all over the world, except in polar areas.

PELION (39° 26′ N., 23° 3′ E.), mountain, Magnesia, E. Thessaly; celebrated in Gk. myth.; modern Zangora or Plessidi.

PELLA (40° 44′ N.; 22° 27′ E.), capital of ancient Macedonia; Alexander the Great's birthplace.

PELISSIER, AIMABLE JEAN JACQUES, DUC DE MALAKHOFF (1794-1864), a marshal of France, *b.* at Maromme, near Rouen, and studied at the military colleges of La Flèche and St. Cyr. He served in Spain in 1823, in the Morea in 1828, and joined the first expedition to Algiers in 1830. In 1839 he was made lieutenant-colonel and returned to Algeria, taking part in the battle of Isly in 1844. He was made general of division in 1840, and in the Crimea was at first in command of the first corps and afterwards held the chief command before Sebastopol. The storming of the Malakhoff was his most notable success; for this he received a marshal's baton, was created Duc de Malakhoff on his return to France, and was granted 100,000 francs.

PELLAGRA, an endemic disease occurring in Italy, Spain, Egypt, as well as in several other widely separated parts of the world, characterized by a burning of the skin, a red rash, pigmentation, nervous disorders, muscular wasting, and progressive general weakness; formerly believed to be due to eating diseased corn, but now attributed to a protozöon communicated by sand flies. Arsenic has a beneficial effect. In recent years pellagra has appeared in U.S. and Great Britain; investigations by tropical medicine schools are in progress. Researches of the Rockefeller Foundation have resulted in greatly imrpoved conditions in the treatment of pellagra.

PELLICANUS, CONRAD (1478-1556), Ger. Prot. divine; studied at Tübingen; wrote first Hebrew Grammar in a European language; prof. at Zürich; a good scholar, and man of fine character.

PELLICO, SILVIO (1788-1854), Ital. poet and dramatist; was intimate with Byron, and trans. his *Manfred* into Italian.

PELLITORY (*Parietaria*), genus of plants, order Urticaceae; Common P. (*P. officinalis*) has reddish stem, narrow leaves, and small flowers.

PELOPIDAS (*d.* 364 B.C.), Theban patriot; exiled, 382; drove out Spartans and oligarchs, 369; organised 'sacred band' of Theban youths, who established Theban military prestige.

PELOPONNESIAN WAR (431-404 B.C.), conflict between the Delian League (Athens and her allies) and Peloponnesian confederacy (Sparta, etc.). Three periods: (1) The *Archidamian War*, 431-421; (2) 421-413; (3) The *Decelean War*, 413-404.

(1) Athens had incurred jealousy of Sparta, and provoked war by damaging Corinthian trade. Immediate cause was aid given by Athens to Corcyra, in its revolt against Corinth, 434-433. Corinth in return stirred up Potidaea against Athens and made new coalition with Sparta against Athens, 432. Siege of Athens was repeated, 430, when besieged were visited by terrible plague. 428, 427. Athenian fleet meanwhile won great successes, culminating at *Pylos*, 425, when Sparta sought peace. Failure at *Megara*, *Amphipolis*, and *Delium*, 424-422, made Athens accept truce of 50 years.

(2) Anger of confederacy with Sparta and intrigues of Athenians, Nicias and Alcibiades, led to alliance of Sparta and Athens, 421, but Athens accepted leadership of democratic states of Peloponnesus, 419; terrible disaster of Athens in Sicilian expedition, 415, put her at mercy of Sparta.

(3) Sparta now made Attic town of Decelea her base of operations against Athens. Persia again established suzerainty over Asia Minor, aided by Sparta, the banished Alcibiades assisting them with his advice; and the members of Delian League revolted. Athenians, with exhausted treasury, still retained naval supremacy, and Alcibiades, recalled, destroyed Spartan fleet at *Cyzicus*, 410. Restoration of Spartan fleet under Lysander led to crushing victory of *Ægospotami*, 405. [Athens fell, 404.

PELOPONNESUS (37° 28′ N., 22° 10′ E.), ancient name of peninsula forming southern part of Greece; modern Morea. See GREECE.

PELOPS (classical myth.), grandson of Zeus and *s.* of Tantalus, who killed him and presented him as a dish at an entertainment given to the gods. He was credited with reviving the Olympic games.

PELOTAS (31° 38′ S., 52° 24′ W.), town, Rio Grande do Sul, Brazil; trade in cattle, meat-preserving works. Pop. 20,000.

PELTUINUM (modern Ansedonia) (42° 22′ N., 13° 35′ E.), ancient town, Italy, on Via Claudia Nova.

PELUSIUM (30° 55′ N., 32° 30′ E.), fortified town, ancient Egypt, on Pelusiac mouth of Nile.

PELVIS, the bony basin which supports the abdominal viscera and distributes the weight of the trunk to the two legs. It is formed by the sacrum, the coccyx and the ossa innominata, or haunch bones; each of the haunch bones consists of three originally separate bones, grown together in the adult; the ilium, ischium, and pubis. At the junction of these a socket is formed which takes the ball-end of the femur, or thigh-bone. The contained vessels are for both sexes the rectum and urinary bladder; for the male, the vesiculae seminales and the prostate gland; for the female, uterus and ovaries. The female P. is, in consequence, broader but shallower while having a greater capacity; the bones are more slender, the inlet more circular; it is in general modified suitably for the necessity of child-bearing.

PEMBA (5° S., 39° 40′ E.), Brit. island off E. coast of Africa, N. of Zanzibar; made of coral; produces cocoa, cloves. Pop. *c.* 75,000.

PEMBERTON, MAX (1863), Eng. author; *b.* Birmingham; educated at Cambridge Univ.; was editor of *Chums* 1892-3, and of *Cassell's Magazine* 1896-1906; has written many historical adventure novels, including *The Iron Pirate*, 1893; *The Sea Wolves*, 1894; *The Impregnable City*, 1895; *Kronstadt*, 1898; *The Hundred Days*, 1905; *My Sword for Lafayette*, 1906; *Wheels of Anarchy*, 1908; *War and the Woman*, 1912; has also written plays.

PEMBROKE (45° 46′ N., 77° 4′ W.), town ,on Lake Alumette, Ontario, Canada; lumber trade and manufactures. Pop. 5,500.

PEMBROKE (51° 40′ N., 4° 54′ W.), county town, Pembrokeshire, Wales, situated on Creek of Milford Haven; contains mediaeval castle and Monkton Priory. Pembroke Dock or Pater, 2 miles distant, is naval dockyard and garrison town. Pop. 1921, 15,481.

PEMBROKESHIRE (51° 50′ N., 4° 55′ W.), most westerly county, Wales; bounded N., W., and S. by sea, E. by Cardigan and Carmarthen; area, 558 sq. miles. Coast is wild and rugged; chief inlets, Milford Haven and St. Bride's Bay; islands of Ramsey, Grassholm, Skomer, and Caldy lie off coast. Inland are fertile hills and valleys; in N. is Prevelly Range; principal rivers, Teifi, E. and W. Cleddau. Chief towns are Pembroke, Haverfordwest, and Tenby. P. is celebrated for castles. Pop. 1921, 92,056.

PEMMICAN was originally made by N. American Indians and used as a food. It consisted of dried venison, from which all fat was removed. This was made into a paste and afterwards formed into cakes. At present, however, P. is used as a food on arctic expeditions, and is made from beef instead of venison.

PEMPHIGUS, a disease of the skin, characterised by the appearance of large bullae, or blisters, of which fresh crops may continue to come out for several months; these burst, leaving a raw, ulcerated surface.

PENANCE (Lat. *penitentia*), a censure or punishment imposed by the ecclesiastical law for the purgation or correction of the soul of an offender, in consequence of some crime of spiritual cognisance committed by him.

PENANG (5° 18′ N., 110° 4′ E.), island lying extreme N. of Straits of Malacca, off W. coast of Malay Peninsula, with province of Wellesley (on mainland); forms one of Brit. Straits Settlements; capital, Georgetown; total area, 270 sq. miles. Pop. 280,000.

PENARTH (51° 27′ N., 3° 10′ E.), seaport, watering-place, at mouth of Taff, Glamorganshire, Wales. Pop. 16,000.

PENATES, Rom. household gods particularly associated with the store, as the *Lar* was associated with the hearth. As the State was considered a large family, there were public P. as well as private. The State P. of Rome were said to have been carried by Æneas from Troy. To the P. were offered the first-fruits.

PENCILS, in original form, sticks of metallic lead, then of plumbago; graphite powdered and cast into cakes, 1843; now mixed with clay and water and placed in crucible.

PENDANT, in Gothic architecture, an ornamental mass of stone hanging down ir descending from the intersections of a groined vaulting. They are especially found in the florid Gothic type, as, for example, in Henry VII.'s Chapel at Westminster Abbey.

PENDEXTER, HUGH (1875), Author; *b.* at Pittsfield, Maine. In 1896 graduated from a school at Lewiston, Maine. For one year on staff of a Rochester paper. Author of: *Tiberius Smith*, 1907; *Camp and Trail Series*, six volumes; *The Young Trappers*; *Along the Coast* series, two volumes, *Red Belts*; *Gentlemen of the North*; *Kings of the Missouri.* Wrote for newspapers and magazines.

PENDLETON, a town of Oregon, in Umatilla co., of which it is the county seat. It is on the Oregon Railroad and Navigation Company railroad, and on the Washington and Columbia River railroad, and on the Umatilla river. It is the chief distributing center of an extensive wheat growing and cotton raising region. Here is held annually the famous rodeo, or exhibition of skilled riding by cowboys. Its industries include flour mills, woolen mills, machine shops, etc. There is a court house, library, Federal building and State Hospital for the Insane. Pop. 1920, 7,387.

PENDLETON, suburb of Salford (*q.v.*) Lancashire. Pop. 65,000.

PENDLETON FRANCIS KEY, Judge. Graduated from Harvard College in 1870. In 1907-10 corporation counsel of New York City. Was a justice of the Supreme Court, New York, 1st District, term expiring December 31st, 1921, but resigned in 1920.

PENDLETON, JOSEPH HENRY (1860), Marine Corps; *b.* at Rochester, Pa. In 1882 graduated from the United States Naval Academy. In 1884 appointed second lieutenant in the United States Marine Corps; colonel 1911, and brigadier general in 1916. During Spanican War served on the Yankee. In 1918-19 commander of Marine Barracks at Paris Island, South Carolina, and commanded 2nd Advanced Base Force, United States Marine Corps, San Diego, California from 1919-21.

PENDULUM. See CLOCK.

PENELOPE (classical myth.); wife of Odysseus (Ulysses); during his absence at Trojan War many suitors sought her hand, and she put them off on the pretence that she was weaving a robe for Laertes, her father-in-law; she unravelled by night the web she had woven during the day; Odysseus returned to her after 20 years' absence.

PENFIELD, EDWARD (1866); American artist; *b.* New York City. He pursued a course in the Art Students' League, New York, and later studied in Holland and England. He became art editor of the Harper magazines in 1891 and held that position until 1907. As an illustrator and designer he is especially known for the use of 'textures' in the reproduction of his work. He was the originator of the poster in this country, and is also noted for his illustrations in color. Specimens of his mural decorations exist in Randolph Hall, Cambridge, Mass, and in the Rochester Country Club. His publications include *Holland Sketches*, 1907; *Spanish Sketches*, 1911.

PENFIELD, FREDERIC COURTLAND (1855-1922), American diplomat; *b.* Connecticut. He studied abroad for several years and entered the profession of journalism as one of the editors of the Hartford Courant. He was appointed United States vice-consul general at London, in 1885, and from 1893 to 1897 was minister resident at Egypt. President Wilson in 1913 made him ambassador to Austria-Hungary, a position he held until 1917, when diplomatic relations between the two countries were broken. He was an accomplished writer as well as experienced diplomat, and wrote extensively for the magazines on subjects of international interest. He has been the recipient of decorations from many foreign countries. His publications include *Present Day Egypt*, 1899; *Mahmoud Pasha*, 1903; *East of Suez*, 1907.

PENGUIN, SPHENISCIDÆ, interesting order of flightless birds, confined to Antarctic and Southern Oceans; good swimmers and divers, using their wings, totally devoid of quills, as paddles, while on land they walk erect, but awkwardly.

The King (*Aptenodytes patagonica*) and Emperor Penguins (*A. forsteri*) are two of the largest species, the latter nesting and hatching its eggs in mid-Antarctic winter

PENINSULA, a piece of land nearly surrounded by water, *e.g.* Balkan, P., Denmark, Fla. (the 'Peninsular State'), Italy, Malay P., Morea, Scandinavia; Spain and Portugal form *the Peninsula* or Iberian P.

PENINSULAR WAR (1808-14); war in which Britain assisted Spain and Portugal in driving French from Iberian peninsula. Portugal appealed to Britain for aid against Fr. general Junot, and Sir Arthur Wellesley was sent with troops, 1808; won decisive battle of *Vimeiro*, 1808, and Convention of Cintra was made, by which French evacuated Portugal; this constituted the first successful opposition to Napoleon on land. Napoleon made his bro. Joseph king of Spain, 1808, with consent of its king, Charles IV., but people revolted and forced Dupont to make *Capitulation of Baylen*, 1808, by which 18,000 Fr. soldiers surrendered; every town which French retained had to be garrisoned; Napoleon himself led army of 135,000 men, and occupied Madrid, December 13, his marshals winning battles of *Burgos*, *Espinosa* and *Tudela*.

Sir John Moore, who had superseded Wellesley, made *sortie* from Portugal to divert Napoleon from Andalusia; Napoleon turned to attack Moore, who then made famous retreat in bitter weather, fighting as he went; Napoleon, recalled to France, left Soult in command; Soult overtook British at *Corunna*, and Moore was killed in great battle which covered embarkation of his troops, January 16, 1809. Soult then invaded Portugal and captured Oporto while other Fr. armies busily reduced Span. fortresses; Brit. reinforcement sent under Wellesley expelled French and invaded Spain, winning battle of *Talavera*, July 28; French succeeded in capture of Andalusia.

Napoleon dispatched Massena to conquer Portugal, 1810; he entered from N.E., while Soult attacked from Andalusia, a plan which failed from disagreement of the two generals. Wellesley, now Viscount Wellington, was at first compelled to retreat before Massena, and took up position behind *Torres Vedras* near Lisbon. Massena, who received no help from Soult, was not strong enough to attack separately, and endured great hardships as Portuguese had laid waste country round; he retreated into Spain, 1811, but returned and was defeated by Wellington at *Fuentes de Onor* May 5, 1811; Beresford won battle of *Albuera* against Soult's invading army, May 16. Wellington then invaded Spain, and Massena, out of favor, was recalled; France, remained successful in E., and defeated Brit. force under Blake at *Albufera*.

Under Marmont, Massena's successor, France lost *Ciudad Rodrigo*, January 1812, and *Badajoz*, April, thus opening Spain to Portug. attack; by great victory of *Salamanca*, July 22, Wellington compelled Joseph Bonaparte to fly from Madrid and evacuate Andalusia; Wellington occupied Madrid, August 12, but was forced to retire. While Napoleon was fighting life and death struggle in Germany, 1813, Wellington succeeded in establishing himself between Madrid and France, and prevented Joseph Bonaparte crossing the Ebro, defeating his general, Jourdan, at *Vittoria*, June 21, 1813. Wellington then assisted Spanish in expelling French, fought several engagements in Pyrenees, and invaded France, October 1813; victories of *Orthey* and *Toulouse*, 1814; *Peace of Paris*, 1814.

PENISCOLA (40° 24′ N.; 0° 25′ E.); fortified town, Spain, on Mediterranean. Pop. 3,000.

PENITENTIAL; Catholic book imposing and regulating penances due for sin. It began with the discipline of the 'lapsed,' those who had fallen away during persecution. Various p's were compiled; the *Poenitentiale Theodori* became the standard; owing to the development of canon law on the subject, p's were disused after XII. cent.

PENITENTIARY, one of the offices of the papal court. The name *Penitentiarius* is also given to the cardinal who presides over this court. The office of P. is concerned with all questions relating to the confessional and private discipline. It deals with application for the remission of ecclesiastical censures, and for dispensations from the ordinary marriage laws of the Church, and with specially reserved cases of conscience. Meetings for the settlement of these cases are held monthly, and, if necessary, they are then referred directly to the pope.

PENN, WILLIAM (1621-70); Eng. admiral; distinguished as general at sea with Blake against Holland, 1653; took Jamaica, 1655; served against Holland with Duke of York, 1665.

PENN, WILLIAM (1644-1718); Eng. Quaker; founder of Pennsylvania; *s.* of Admiral Sir William P.; ed. at Christ Church, Oxford' sent down for nonconformity, 1661; led gay court life in Paris, 1661-64; attended Quaker meetings at Cork, 1667, and was imprisoned; speedily released, but henceforth a confirmed Quaker; preached in 1668, and was imprisoned, 1668-69, for publishing *Sandy Foundation Shaken* without licence; twice imprisoned, 1607-71; assist-

ed Quakers to settle in New Jersey, 1676 onwards, and negotiated purchase of the colony.

In March 1680-82 P. received, for quitclaim of crown debt, province called *Pennsylvania* after his father, and in 1682 received from Duke of York province afterwards called Delaware. P. immediately drew up constitution for the province, of which he was to be gov. as well as proprietor; its system of gov., council, and assembly was very similar to that of other colonial governments, but no oaths were to be taken and all forms of Christian religion were to be tolerated. P. landed, made treaty with the Indians, founded Philadelphia, and promulgated the 'Great Law' before close of 1682. The Great Law made swearing, drunkenness, incontinence, together with various amusements, punishable offences. Emigrants flocked in large numbers. P. visited England, 1684, and in 1686 obtained from James II. release of religious prisoners. He pleaded cause of fellows of Magdalen Coll. with king. Suspected of Jacobitism, he was deprived of governorship of Pennsylvania, 1692, but restored, 1694, returned to his colony, 1699-1701, and settled political disputes. These broke out again after his departure for England, and the colony proved unable to support expense of its own government; imprisoned for debt, 1707, and mortgaged the colony.

PENNANT (a compromise between 'pendant' and 'pennon'), the general name for all flags which are long in the *fly* as compared with the *hoist*. A signal. P. is nine ft. long, and tapers from two ft. at the mast to one ft. at the end. The pointed or swallow-tailed flag, about twice as long as it is broad, which used to denote the rank of the commanding officer on the ship, is also called a P., as are the special flags flown at church times, meal times, etc.

PENNANT, THOMAS (1726-98); *b* at Downing, in Flintshire. In 1761, he commenced the publication of his first great work, the *British Zoology*. In 1765, during the progress of this work, P. made a tour on the Continent; P. in 1771, published a *Synopsis of Quadrupeds*. The *Synopsis*, when enlarged, was republished under the title of a *History of Quadrupeds*. After his return to England, P. commenced a work on *Indian Zoology*, of which 15 folio plates were published. The next work which P. commenced was a systematic catalogue called the *Genera of Birds*; this was intended to be similar in plan to the *Synopsis of Quadrupeds*, but was never completed. His last great work was his *Arctic Zoology* (3 vols.).

PENNAR, NORTH, PENNER, PINAKINI (13° 23′ N., 77° 43′ E.), river, India; enters Bay of Bengal below Nellore.

PENNAR, SOUTH (13° 32′ N., 77° 45′ E.), river, India, falls into Bay of Bengal near Fort St. David.

PENNELL, ELIZABETH (ROBINS) (1855), an American authoress; *b.* at Philadelphia, Pa.; *dau.* of Edward and Margaret Holmes Robins. She was educated at the Convent of the Sacred Heart, Conflans, Paris, and at Eden Hall, Torresdale, Philadelphia. She married Joseph Pennell (*q.v.*), in 1884, who illustrated most of her works. Author: *Life of Mary Wollonscraft, 1884*; *Feasts of Autolycus, 1896*; *Charles Godfrey Leland* (2 vols.), *1906*; *French Cathedrals, Monasteries and Abbeys, 1909*; *Our House and the People in it, 1910*; *Our House and London out of Our Windows, 1912*; *Our Philadelphia, 1914*; *Nights, 1915*; *The Lovers, 1917*; and also edited with her husband the *Whistler Journal*, in 1921.

PENNELL, JOSEPH (1860), an American artist, illustrator and writer, *b.* in Philadelphia, Pa. He studied in the Pennsylvania Academy of Fine Arts and the Pennsylvania School of Industrial Art. In 1920 he was lecturer on the graphic arts at the National Academy of Design. He has illustrated a large number of books, and in 1921, in collaboration with his wife, Elizabeth Robins, edited The Whistler Journal. Among the books he has written are *A Canterbury Pilgrimage*, 1884; *The Stream of Pleasure*, 1891; *The Jew at Home*, 1892; *Modern Illustrations*, 1895; *The Authorized Life of J. Mc N. Whistler* (in collaboration with his wife,) 1910; and *Etchers and Etchings*, 1919.

PENNINE CHAIN (54° 15′ N., 2° 25′ W.), range of hills stretching from Cheviot Hills to the Peak in Derbyshire, and forming one of chief watersheds in England; principal heights, Cheviot (2,676 ft.), Crossfell (2,930 ft.), Whernside, and Ingleborough.

PENNSYLVANIA, a N.E. state of U.S. (39° 43′-42° 15′ N., 74° 43′-80° 51′ W.), with an area of 45,126 sq. m., of which 294 sq. m. are water. Its extreme length (E. to W.), is 302 m., and width between the parallel N. and S. boundaries 158 m. It was one of the thirteen colonies, and an original state. The surface is varied. The S.E. is rolling, and drained mainly by the Delaware and Susquehanna rivers; farther N. and W. rise the parallel ridges and valleys of the Appalachians. Then succeeds the Alleghany front, from whose summit (3,000

ft.) the Alleghany plateau slopes N.W., deeply scored by streams. The highest peak is Blue Knob (3,136 ft.). The w. contains the Allegheny and Monongahela rivers, which unite at Pittsburg to form the Ohio. The state is fairly wooded. The cap. is Harrisburg, on the Susquehanna; other chief cities are Philadelphia, Pittsburg, Scranton, Reading and Erie. The univ. of Pennsylvania is situated at Philadelphia, and the univ. of Pittsburg (till 1908 the Western Univ. of Pennsylvania) at Pittsburg. Although manufacturing and mechanical industries are pre-eminent, farming is of great importance. The principal crops are corn, oats, wheat, rye, buckwheat, and tobacco. The manufactures are second only to those of New York; while in certain branches—notably in iron and steel—this state is the most important. The leading branches are iron and steel, textiles, foundry and machine-shop products, cars, leather, flour, printing and publishing, sugar and molasses refining, lumber, petroleum refining, clothing, and tobacco. Pennsylvania contains a vast amount of bituminous coal, including a fine coking coal in the Connellsville district. The Alleghany plateau is to a great extent underlain by coal beds. It contains almost the only deposits of anthracite coal in the country. In the W. of the state petroleum and natural gas are abundant, and iron ore is found in many localities. The extraction of coal reaches over 275,000,000 tons monthly, produced by over 325,000 miners; the Connellsville region produces 30,000,000 tons of coke. The output of iron ore is over 500,000 long tons; of pig iron, 14,701,252 long tons; while the yield of petroleum is over 7,000,000 barrels of 42 gallons each. Iron smelting is carried on mainly in and around Pittsburg. Pop. 1920, 8,720,017. See Map of U.S.

PENNSYLVANIA CANAL. See CANAL.

PENNSYLVANIA COLLEGE, a nonsectarian institution founded in 1870, in Pittsburgh, Pa. Its productive funds amount to $420,000 and it has a library containing 5,000 volumes. It has a faculty of 20 and a student body of 190.

PENNSYLVANIA COLLEGE FOR WOMEN, founded in 1869, under the auspices of the Presbyterian Church, in Pittsburgh, Pa. It has a college department and classical and literary courses, and a social welfare department giving the students field experience in co-operation with the charitable institutions of the city. The faculty numbered 25, in 1922, and the student body 198.

PENNSYLVANIA DUTCH, the dialect of, and the people themselves, inhabiting certain parts of Pennsylvania. They are the descendents of early German settlers, beginning with Pastorius, who founded Germantown, in 1683, and numerous groups that came after, down until the middle of the eighteenth century. The majority came from the Rhenish Palatinate, Württemberg and German Switzerland, therefore spoke High German. About 100,000 of them settled in the southwestern counties of the state, especially in Lancaster, Schuylkill and Lehigh counties. Like the early New England colonists, they came mainly to escape religious persecutions and to live in a land where they might worship according to their own creeds. Their communities being bound together by this strong religious faith, they remained isolated from their neighbors, therefore continued speaking the language of their native country for generations, even up to the present time. As in the case of all isolated language groups, such as the Canadian French, their speech has undergone changes peculiar to itself. The name 'Dutch' was applied to them by ignorant American neighbors only because the Germans in their own language call themselves 'Deutch,' and the sound is similar enough to Dutch to have caused the misnomer. The changes in the dialect from the original German are mainly in certain vowel sounds and misplaced consonants, and a native of Germany proper has no difficulty in conversing with them. The dialect has very little literature, that little being restricted to religious pamphlets and a small proportion of folk poetry.

PENNSYLVANIA STATE COLLEGE, one of the land grant institutions, founded in 1862, at State College, Pa., or developed, rather, from the Farmer's High School there, founded in 1855 and one of the first agricultural schools established in the United States. It has courses in agriculture, engineering, home economics, the liberal arts, mining and the natural sciences. It has an experiment station in mining, as well as an agricultural experiment station. Its teaching staff numbers 255, and a staff of extension lecturers numbering 85. The students numbered 3,372 during 1921-2.

PENNSYLVANIA, UNIVERSITY OF, an educational institution founded in Philadelphia, Pa., in 1751, its founders, a group of local citizens, being inspired by a pamphlet written by Benjamin Franklin, entitled 'Proposal Relating to the Education of Youth in Pennsylvania,' published in 1749. It was merged with a charity school, founded ten years previously, the two being housed together.

The charity school later evolved into a system of free scholarships. In 1753 a charter was granted by the owners of the colony to the institution as a 'college and academy'. For many years financial difficulties formed serious obstacles, but in 1761 a fund was raised in England, through the assistance of the Archbishop of Canterbury. The college was closed almost two years during the Revolutionary period, the Continental Congress holding a session in the school building in July, 1778. By 1791 the institution had established itself on a firm basis and assumed its present name. The first buildings on the present site were erected in 1872. At the present time there are 33 buildings, with a stadium capable of seating 25,000 people. It now ranks with the leading universities of the country. It was the first university to open departments of medicine, the sciences, engineering and technology. The institution is constituted as follows; the College proper; the Graduate School; the Law School; the School of Medicine; the University Hospital; the Wistar Institute of Anatomy and Biology; the Laboratory of Hygiene; the School of Dentistry; the School of Veterinary Medicine; the Veterinary Hospital; the University Library; the University Museum; the Flower Astronomical Observatory; the Department of Physical Education; the Wharton School; the Towne Scientific School; the School of Education; the Henry Phipps Institute; the Graduate School of Medicine; and the Evans Institute. In 1922 the enrollment of students was 10,193 and the teaching staff numbered 1,006.

PENNY, the most ancient of English coins. First mentioned in the laws of Ina, king of the West Saxons, it weighed then about 1-240 of the Saxon pound weight. The Romans similarly divided the *libra* into 20 *solidi*, and the *solidus* into 12 *denarii, i.e., 1 denarius*—1-240 of a *libra* or pound. Until the time of Edward I., half-pennies and farthings were not coined, but the P. was deeply indented with a cross so that it could be broken into four parts. Under Edward VI., silver farthings ceased, and silver half-pennies under the Commonwealth. In 1672, half-pennies and farthings were struck in copper, and P's in the same metal, in 1797. These copper P's had the value of 1-62 of an ounce of silver, but the bronze P., introduced in 1860, has only about half this value. The German *pfennig* was also originally silver, and bore the same relation to the German pound of silver as the English P. to its pound. In the modern German system the *pfennig* is a copper coin. P. is colloquially used for 'cent' in the Eastern U.S.A.

PENNYPACKER, SAMUEL WHITAKER (1843-1917), a governor of Pennsylvania, *b.* in Phoenixville, Pa. He served in the Federal Army during the Civil War, then studied law at the University of Pennsylvania, beginning to practice in Philadelphia. He was president of the Law Academy of Philadelphia. in 1868 and in 1902 was elected Governor of the State. Among his legal works are four volumes of *Supreme Court Reports*, a *Digest of English Common Law Reports*, and his other works include *Pennsylvania in American History* and *The Settlement of Germantown*.

PENNYROYAL (*Mentha pulegium*), a species of Mint; grows on damp moors, and has a well-known scent; a popular medicine.

PENOBSCOT, a river of Maine, having two important branches. The W. branch rises near the Canadian frontier and flows E. and S. E., meeting the E. branch, or Sebois river. Afterwards it flows S.W. into Penobscot Bay. The river is navigable for large vessels to Bangor, 60 miles from the mouth.

PENOBSCOT INDIANS. See INDIANS, AMERICAN.

PEONAGE, being derived from the Spanish word 'peon,' signifying a servant or laborer, in its special meaning has reference to a condition of servitude which had its origin in the Spanish-American countries. The peon was, and still is, in Mexico and other Latin-American countries, an agricultural laborer receiving a wage so low that his master is compelled to advance him money or provisions, usually the latter, in excess of his wages, the difference standing as a debt of the servant to the master. Under the laws of Mexico and the other countries the laborer may not leave his master's employ until this debt has been cleared up. In Mexico the master is compelled once a year to give the laborer two weeks freedom in which he may find another master if he so chooses, who must, however, liquidate the debt of the laborer. A condition of servitude somewhat similar, also known as peonage, has existed in the Southern States. There the peons are usually convicts leased out by the counties to private employers, in whose service they must remain until their earned wages have paid the amount of a fine which the convict was unable to pay at the time of conviction. The system has been the cause of many abuses. As a result of an investigation carried on by the U. S. Immigration Commission, in 1908, it

was shown that many of these convicts, guilty of minor offenses, were held in stockades for years continuously. The majority of the convicts are negroes, but a large proportion are white men, usually wandering tramps who have been arrested on a charge of vagrancy and sentenced. In 1923 one of these white convicts was flogged to death in a labor camp in Florida, resulting in an investigation by the Florida legislature.

PENOLOGY. See PRISON REFORM.

PENRHYN, GEORGE SHOLTO GORDON DOUGLAS-PENNANT, 2ND BARON (1836-1907), *s.* of Colonel Edward Gordon Douglas, first Lord P.; Conservative M.P. for Carnarvonshire, 1866-68 and 1874-80; refused to recognise quarrymen's trade union at P. slate quarries, North Wales.

PENROSE, BOIES (1860-1921), lawyer and United States senator; *b.* in Philadelphia, November 1, 1860; *d.* there December 30, 1291. Graduating from Harvard in 1881, he studied law under Wayne MacVeagh, and joined the bar in 1883. For several years he practised law in Philadelphia and was elected to the Pennsylvania House of Representatives in 1884, and to the senate in 1886. Re-elected 1890, and 1894. Elected president pro tempore of senate, 1889, and 1891. Delegate to the Republican National Convention, 1900, 1904 and 1908. Chairman of Republican State Committee, 1903-05. Elected member of the Republican National Committee from Pennsylvania, 1904. Re-elected 1908. United States Senator to succeed J. Donald Cameron for term beginning March 1897. Re-elected 1903, 1909 and 1914.

PENROSE, RICHARD ALEXANDER FULLERTON, JR. (1863), an American geologist, *b.* in Philadelphia, Pa. He graduated from Harvard University, in 1884, was geologist in charge of the survey of Eastern Texas for the Texas Geological Survey, 1888, was appointed by the Geological Survey of Arkansas, 1889 to make a detailed report of the manganese and iron ore regions of Arkansas, and later became professor of economic geology at the University of Chicago. He had written *Geology of the Gulf Territory of Texas*, 1889; *Manganese; Its Uses, Ores and Deposits*, 1890; and *The Iron Deposits of Arkansas*, 1892.

PENS of metal superseded quill, *c.* 1840, though they were known as early as Rom. era; reed pens similar to those used in ancient times are still used by Persians, while Chin. and Japanese characters demand a fine brush. When wax tablets were used for paper, wooden *stylus* was employed to incise characters.

PENSACOLA, a city of Florida, in Escambia co., of which it is the county seat. It is on the Pensacola, Alabama and Tennessee, the Louisville and Nashville, and the Gulf, Florida and Alabama railroads, and on Pensacola Bay. The city is a large trade and lumbering region and its other industries include shipment of iron, coal, cotton and naval stores. It has a custom house, court house, and a marine hospital. The city was settled by Spanish colonists before 1700. It was captured in 1719 by the French under Bienville but was soon afterward resorted. During the wars of Napoleon the British held the place and organized expeditions in its harbor. It was seized by General Jackson in 1814 and the British withdrew after blowing up the fort. Pop., 1920, 31,035.

PENSACOLA BAY, an inlet of the Gulf of Mexico, on the W. coast of Florida, with a depth of 25 miles and attaining a width of ten miles. The northern part is divided into North Bay and West Bay. It forms one of the safest harbors in that part of the world being almost completely land-locked, the entrance being narrow and barred by Santa Rosa Island. The town of Pensacola is situated on the W. shore. A U. S. Navy yard and a naval hospital are located at Warrington, also on the W. shore. The harbor is defended by three forts: Fort Pickens, on Santa Rosa Island, Fort Barrancas, on the inside shore of the bay, and Fort McRee, on a sand bar projecting into the Gulf.

PENSHURST (51° 12′ N., 0° 12′ E.), village, Kent, at confluence of Eden and Medway; Sir Philip Sidney's birthplace.

PENSIONS. The granting of pecuniary rewards by public and private authorities, national or local, in the form of superannuation allowances for services rendered has long been an established custom in most civilized countries. Individual and corporate firms grant such annual gratuities to retired employes. Governments pay them for military and civil services and for disablement, and also to the aged. American states and municipalities have pension rolls, their beneficiaries including poor mothers and teachers. The recurrence of wars has made the system of paying military pensions the most extensive of all forms of rewards for service and it has developed in the United States more than in any other country.

Military pensions were paid in colonial times as early as 1636. The first national pension laws came in 1776 and 1778, when half pay was granted to disabled

PENSIONS

soldiers of all ranks who fought in the Revolutionary War, and for seven years to all others who served throughout that conflict. Funds, however, were lacking the new Congress was then not powerful enough to enforce its behests on the States, and some of the latter refused to pay. In 1793 monthly pensions of $5 (later raised to $8) were granted to disabled privates and non-commissioned officers and half pay to disabled commissioned officers. Service pensions were introduced in 1818, when revolutionary war veterans, if in penury, became entitled to from $8 to $20 a month. In 1832 all survivors of the war were either granted full pay for life or sums proportioned to length of service, and soldiers' widows were also pensioned. General laws governing pensions for regular army service, for injuries received when on duty. and for pensioning widows were already in existence, and allowances to soldiers incapacitated in the War of 1812, the Mexican War and the various Indian wars were paid under them. Legislation in 1871 and later granted service pensions to survivors and widows of survivors of these wars. The Civil War created pensions ranging from $8 to $30 a month to men (or their widows), disabled in the service of the Union army or navy after March 4, 1861. Further legislation established fixed sums for specific disabilities, such as $25 monthly for the loss of both hands, feet or eyes. The tendency of legislation has since been towards greater liberality, as evidenced by pension measures passed in 1879, 1890, 1907, 1912 and 1916.

While specified army and navy officers are granted only $30 a month for total disability, they are usually placed on the retired list and draw three-quarters of the amount of the full-pay of their rank. Generals or their widows receive pensions commensurate with their rank, but only by special legislation. Privates are granted $8 a month for total disability. Pensions granted to participants or their survivors in the World War were governed by laws existing at the period of service or by the War Risk Insurance Act of 1917.

In 1922 there were 547,016 persons on the United States pension rolls, composed of 256,918 invalid and 282,965 widows, 4,102 dependants, 2,106 minors and 925 helpless children. Of the invalids 90 were surviving army nurses of the Civil War and 193,791 Civil War soldiers; of the widows, 269,245 were Civil War beneficiaries. There were 49 surviving widows of the War of 1812, 73 soldiers and 1878 widows of the war with Mexico, 3267 soldiers and 2,748 widows of the Indian wars, and 55,153 pensioners of the war with Spain.

On the regular pension roll were also 61 World War soldiers and 29 widows and other dependants. Most of the World War pensions, however, were handled by the U. S. Veterans' Bureau, formerly the Bureau of War Risk Insurance. By the middle of 1922 the total claims allowed by the Bureau numbered 58,875 for death and 351,940 for disability, and the total sum paid was $359,564,738. For total and temporary disability the monthly compensation is $80 if the disabled person has neither wife nor child; if he has a wife and child, $90; if a wife and more than one child living, $95, and more than two children living $100; if he has no wife but one child $90, with $5 for each additional child; if he has a father and mother, either or both dependent on him, he gets $10 in addition for each dependent parent. Where the disability is total and permanent the rate of monthly compensation is $100 or $200 according to the loss of physical members or whether the disabled person is bedridden. The government stated in 1922 that the Veterans' Bureau paid out more than $1,000,000 daily in cash direct to ex-service men and their dependents, and provided care and treatment, without charge, to 30,000 veterans, including board and lodging, representing an expenditure of $60,000,000 a year. The Bureau also conducted an insurance business for more than 600,000 ex-service men, representing insurance in force amounting to $3,500,000,000. The Bureau required $510,000,000 to conduct its operations in the year named. Great Britain's allowance to World War veterans in 1921-2 amounted to $535,000,000.

In 1923 old-age pensions were adopted in the United States by Montana, Nevada and Pennsylvania. Investigating commissions found a large number of aged people dependent on charity in Massachusetts, Connecticut, Pennsylvania and in several Western states. In Montana and Nevada persons more than 70 years of age whose income does not exceed $300 a year are entitled to $25 monthly, and in Pennsylvania to $1 a day if such persons own less than $3,000 worth of property. Old-age pensions had previously been adopted in the British Isles, the principal European countries and in Australasia. In Great Britain every British subject resident there and over 70 years of age, whose income did not exceed $250 a year, became entitled under certain conditions to a pension of $2.50 weekly and upward according as the pensioner's other means of subsistence are below $250 a year. In 1920-21 pensions aggregating $125,500,000 were payable to 353,795 men

and 648,548 women.

Civil service persions have not yet become established in the United States beyond those allowed to federal, and, in some cases, State judges. Federal judges can retire on reaching seventy years of age on full salary if they have served on the bench ten years or more. Pensions for retired civil servants have long been established in European countries.

PENSIONS, MOTHERS', a recent method of granting public aid for the care of minor children whose mothers are either widowed or deprived of support from their husbands through desertion and other causes. It originated in 1911 in Missouri, whose legislature passed a limited measure providing for payment of a regular allowance (not as charity) to indigent mothers for the care of their own children. Later large cities were authorized to establish boards of children's guardians who could board out children even to their own mothers. Once begun, the movement for aiding distressed mothers or widows swept through a majority of the states, so that by 1917 more than half had adopted measures for paying mothers' pensions, though their laws are by no means uniform as to the conditions under which grants are made. The measures embrace provisions for widows with minor children; mothers whose husbands were in prison, insane asylums, or who had deserted them; or any women, whatever her status, with minor children in need of aid. The rapid increase of state legislation restricting child labor was a leading influence in hastening the passage of laws providing money grants to mothers. It was deemed a better alternative to direct outdoor relief by public or private charities, or to the separation of children and mothers through the former living in children's homes or asylyms or with strangers, the care of children by their own mothers being regarded as superior to their care by other agencies. In 1922 the states providing for mothers' pensions were California, Colorado, Idaho, Illinois, Iowa, Kansas, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nevada, Nebraska, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Tennessee, Utah, Washington, Wisconsin and Wyoming.

PENTAMETER, verse with five metrical feet (*e.g.* Blank Verse or *Iambic P.*), as—

'The qual / ity / of mer / cy is / not strained.'

PENTANE, C_5H_{12}, a hydrocarbon of the paraffin series, existing in three isomeric modifications—viz., normal pentane, $CH_3CH_2CH_2CH_3$; isopentane, $(CH_3)_2CHCH_2CH_3$; and tetra-methylmethane, $C(CH_3)_4$. The first two occur in Amer. petroleum and in the product of distillation of shale. The pentanes are very volatile, inflammable liquids, which are of low density and very resistant to chemical action. Commercial pentane, which contains the normal and iso varieties, together with more or less of the higher homologues, is the combustible employed in pentane lamp, which is used as a standard of luminosity. It is also one of the chief components of the mixtures which under the names of petroleum ether, petrol, rhigolene, gasolene, are used in internal combustion motors, for lamps, and as a solvent for fats and resins.

PENTATEUCH, term applied to Mosaic books, *Genesis* to *Deuteronomy* (qq. v.) inclusive.

PENTECOST, ancient Jewish festival, in celebration of ingathering of harvest. It lasted fifty days, whence its name (Gk. for 'fifty'). In later portions of Pentateuch full ritual directions are given for its observances.

PENTELICUS (38° 2′ N., 23° 55′ E.); mountain, Attica, Greece; modern Mendeli; marble quarries.

PENTHESILEA, queen of Amazons; slain by Achilles.

PENTLAND FIRTH, a channel separating the Orkney Is. and Caithness, N. Scotland. It is 14 m. long and from 6 to 8 m. wide, and crossed by a ferry-line, but strong tidal currents and whirlpools render navigation dangerous.

PENTLAND HILLS, a ridge in the Lowlands of Scotland, extending N.E. from the border of Lanarkshire, through Peeblesshire, to the center of the co. of Edinburgh, and to within 4 m. of the city of that name.

PENTOSES. A group of sugars the molecules of which contain five carbon atoms, the general formula being $C_5H_{10}O_5$. Only two of the known pentoses occur naturally—arabinose and xylose—but lyxose and ribose have been prepared artificially. Arabinose and xylose are widely distributed in plants, and occur in the tissues of the animal body. Arabinose may be prepared by boiling a solution of gum arabic with dilute sulphuric acid for a few minutes. The solution is then neutralised with barium hydroxide, alcohol added as long as a precipitate is produced, and the clear alcoholic solution evaporated to a syrup, which deposits crystals of arabin-

ose. Xylose is prepared by a similar method from Xylan, a gum extracted from wood by dilute caustic soda. Pentoses are not fermentable by yeast.

PENTSTEMON, genus of plants, order Scrophulariaceae; native of America, but cultivated in Brit. gardens; flowers of great beauty, e.g. *P. Hartwegi*, a scarlet flower.

PENUMBRA, a margin of a shadow observed in an eclipse within which the rays of light from an illuminating body are partly but not wholly intercepted. The name is also given to the dark fringe around the central part of the sun spot. In painting, the penumbra is the blending point between light and shade.

PENZA—(1) (*c.* 53° 45′ N., 44° 30′ E.), government, E. Russia; area, 14,997 sq. miles; watered by tributaries of Don, Oka, and Volga; produces grain, manufactures flour, leather, woolens. Pop. 1,800,000. (2) (53° 10′ N., 45° 3′ E.), chief town of above, at junction of Sura and Penza; paper- and flour-mills. Pop. 70,000.

PENZANCE (50° 7′ N., 5° 33′ W.), municipal borough, seaport, market town, and popular watering-place, Cornwall, England. Pop. 1921, 12,096.

PEONY (*Poenia officinalis*), a member of the Ranunculaceae, possessing showy, honey-bearing flowers and tuberous roots; fruit a follicle.

PEOPLE'S PARTY. See POPULIST PARTY.

PEORIA, a city of Illinois, in Peoria co., of which it is the county seat. It is on the Chicago, Peoria and St. Louis, the Chicago and Alton, the Chicago, Rock Island and Pacific, and other railroads, and on the Illinois River, at the foot of Peoria Lake. The city has a water front of about 4 miles. It has an excellent system of parks and driveways. Its industries include barrel factories, foundry and machine shops, planing mills, flour and grist mills, glucose factories, rolling mills, stock yards, meat packing plants and grain elevators. There are in all over 600 industrial establishments. The site of the city was first chosen by La Salle in 1680 as a trading post. It was settled in 1779 and was incorporated in 1854. In 1890 South and West Peoria were annexed. Pop.1920,76,121.

PEPE, GUGLIELMO (1783-1855), Neapolitan soldier; supported Murat, but accepted Bourbon restoration; exiled, 1821; commanded against Austria, 1848-49, showing great skill and courage in defence of Venice; wrote accounts of events of time.

PEPIN I. (*d.* 640), mayor of palace to Dagobert I.—P. II. (*d.* 714) established power over Neustria and Austrasia and external states.—P. III. (*d.* 768) crowned, 751; *f.* of Charlemagne.

PEPLE, EDWARD HENRY (1869), Author; *b.* in Richmond, Va. Educated at academies and high school in Virginia. In 1895 moved to New York. Worked with business concerns as accountant and expert accountant. Author of: *A Broken Rosary*, 1903; *The Prince Chap*, 1903, which was later made into a motion picture; *Semiramis*, 1907; *Mallet's Masterpieces*, 1909; *The Spitfire*, 1908; *A Night Out*, 1909; Plays produced *The Prince Chap*; *The Love Route*, *The Mallet's Masterpiece*, *The Spitfire*, *The Call of the Cricket*, *The Littlest Rebel*, *The Clairvoyant*, *Cur and Coyaote*, 1913; *A Pair of Sixes* (produced 1914); *The Girl* (produced, 1915); *An Auto-Biography*, (published 1915); *Friend Martha* (produced 1917); *Maggie* (produced 1918); *The War Dog)* published 1918); *Ladies' Day*, (produced 1920) *Her Birthright* (produced 1921).

PEPPER is, properly speaking, the product of unripe berries of *Piper nigrum*, a tropical shrub of climbing habit. Both black and white p. of commerce are derived from the same plant; the latter's loss of color being due to removal, by maceration, of dried skin. The leaves of an allied form, *P. Betle*, are chewed by Asiatics, with areca-nut and a little lime, as a preventive of dysentery.

PEPPER, GEORGE WHARTON (1867), American lawyer and United States senator; *b.* in Philadelphia, March 16, 1865. Graduated from the University of Pennsylvania, 1887. A.B. LL.B. 1889. Admitted to the bar 1889. LL. D. University of Pennsylvania 1907; Yale 1914. A member of the Philadelphia law firm of Henry, Pepper, Bodine, and Stokes, and then practiced alone. Member of the U.S. senate for the unexpired term of Boies Penrose, deceased, 1921-1927. Professor of law at the University of Pennsylvania 1893-1910. Lyman Beecher lecturer at Yale, 1915. Trustee of the University of Pennsylvania. Fellow of the American Academy of Arts and Sciences. Author *Borderland of Federal and State Decisions*, 1889; *Pleading at Common Law and Under the Codes*, 1891; *Digest of Laws of Pennsylvania*, 1900-1901; *Digest of Decisions, and Encyclopedia of Pennsylvania Laws*, 1754-1898; *The Way*, 1909; *A Voice from the Crowd*, 1915.

PEPPER, WILLIAM (1874), an American physician, *b.* in Philadelphia, Pa. He received his M.D. degree from the University of Pennsylvania, in 1897, and two years later became a member of the teaching staff of that institution, being dean of the School of Medicine since 1912. During the World War he was an officer of the U. S. Army Medical Corps, being commanding officer of Base Hospital 74.

PEPPERMINT (*Mentha piperita*), member of Labiatae, with smooth stem and stalked ovate leaves, yielding, on distillation, an oil used medicinally and also in flavoring. For this purpose the upper parts of the plant, including the flowers, are cut in August, and left to dry on the ground before treatment. The cheaper kinds of p. cordial are not prepared from the plant extract, but are derived from an artificial substitute with similar properties.

PEPSIN, a ferment or enzyme obtained by drying the fresh stomach of a pig, sheep, or calf; consists, as med. employed, of a pale yellow or brown powder or translucent scales; used to assist gastric digestion in debilitated conditions or to predigest albuminous food. See DIGESTION.

PEPTONES. Compounds formed by the action of the gastric or pancreatic juices on protein. They are sometimes used as nutriment for those in whom disease has rendered the stomach incapable of doing its work. Attempts have been made to inject them directly into the circulatory system, but under such conditions they are not assimilated. If given by the mouth, however, they are of high nutritive value, although they sometimes cause diarrhoea, especially if given in too concentrated form. Peptonised milk is prepared by adding *liquor pancreaticus* to cow's milk.

PEPYS, SAMUEL (1633-1703), Eng. diarist; *b.* London (probably); ed. Huntingdon, St. Paul's, Cambridge Univ.; m. Elizabeth St. Michel, a young girl, 1655; app. Clerk of the Acts of the Navy, 1660, and Sec. to the Admiralty, 1673. He was imprisoned in Tower, 1679, on charge of selling information to French. Though acquitted, he lost his post. Reappointed, 1684, he held his office till 1689. His *Diary*, begun 1659, was in cipher, and was never intended for publication. Hence he wrote freely of his thoughts, his vices, his domestic affairs; he noted down all the scandal he heard. It is invaluable as a source of information concerning XVII.-cent. manners. It stops short at May 1669. It was deciphered by Smith and pub. 1825. P. also wrote *Memoirs of the Navy* 1690.

PEQUOT OR PEQUOD, INDIANS, a branch of the Mohegans, and a member of the great Algonquian family, who in the early days of New England inhabited a territory lying between the Niantic River, Conn., and the boundary with Rhode Island, where New London, Groton and Stonington now stand. At the heighth of their strength, shortly before and after the settlement of New England, they numbered about 3,000, and made treaties with both the English and the Dutch. In 1636 they engaged in a war against the white settlers, as a consequence of which they were driven off their territory and scattered, most of the survivors finding refuge among neighboring tribes. A few of their descendants may still be found near Groton.

PERA. See CONSTANTINOPLE.

PERAK, one of the federated Malay states, under British protection since 1874, on the W. coast of the Malay Peninsula, and washed by the Strait of Malacca. Taiping is the capital. Area, 6,600 sq. m. Pop. 430,000—Malays Chinese, Tamils, Europeans (estimated 670).

PERCEPTION, apprehension of particular objects present to sense. See PSYCHOLOGY.

PERCEVAL, hero of Arthurian legends; Celtic variant of wide group of legends (cf. Romulus, Siegfried); first version extant, *Syr Percyvelles of Galles*; later became hero of Grail search, supplanting original Gawain, and himself supplanted later; Chretein de Troys' *Perceval, Conte del Graal*, first Perceval-Grail poem; later best-known versions, Wolfram von Eschenbach's *Parzival*, Wagner's *Parsifal*, and Tennyson's *Morte d' Arthur*.

PERCHE, ancient division, France, corresponding generally to departments of Eure-et-Loire and Orne; capital, Mortagne.

PERCHES (*Percidae*) include about 90 forms, confined to the fresh waters of the northern hemisphere; excellent game fishes, highly esteemed as food. The Common Perch (*Perca fluviatilis*) is the best known. The large Pike-Perch or Zander (*Centrokumus licioperca*), is a central European game fish.

PERCHLORIC ACID, $HClO_4$, is prepared by distilling potassium perchlorate with concentrated sulphuric acid; is a fuming, volatile, colorless liquid, which dissolves in water with evolution of heat, and is a violent oxidizing agent.

usually acting explosively. The aqueous solution is much more stable. The acid is monobasic, forming a series of salts, the perchlorates, chief of which is potassium perchlorate, used in explosives.

PERCY, Eng. family, founded by William de Perci, who held lands in Yorkshire and Lincolnshire at time of Domesday Survey. His male line died out in co-heiresses, but descendants of his grand-dau., Agnes, assumed name of P.; of this second house, Henry Percy was made Earl of Northumberland, 1377; direct line extinguished, 1670, on death of Joceline, 12th Earl of Northumberland.

PEREDA, JOSÉ MARIA DE (1833-1906), Span. novelist; *b.* at Polanco; apostle of Realist School of Spain. He is perhaps most successful in his descriptions of fisher life, viz. *Sotileza* and *La Puchera.*

PEREYASLAVL.—(1) (56° 43′ N., 38° 54′ E.), town, Vladimir, Russia, on Lake P.; linen-mills, fisheries. Pop. 9,000. (2) (50° N., 31° 30′ E.), town, gov. Poltava, Russia, near Dnieper. Pop. 15,000.

PEREZ, ANTONIO (*c.* 1539-1611), Span. statesman; Sec. of State, 1564; had John of Austria's envoy murdered to please king, 1578; John secured his condemnation, 1581; P. escaped to Aragon; protected by Aragonese against king and Inquisition; escaped from Spain, but Aragon lost its liberties.

PERFECTIBILITY OF CHRISTIANS, a doctrine held by the Wesleyan Methodists of a *Christian perfection* attainable in this life. It is not a perfection of *justification,* but a perfection of *santification*; which John Wesley, in a sermon on Christian Perfection, from the text Heb. VI. 1, 'Let us go on to perfection,' earnestly contends for as attainable in this life by believers. That perfection is attainable in this life is held by the Franciscans, Jesuits, and Molinists in the Church of Rome, but denied by the Dominicans and Jansenists. In advocating the doctrine, its Roman Catholic supporters generally rest much on the distinction between mortal and venial sins. Theosophists and Buddhists generally believe that absolute perfection can (under certain very stringent conditions) be attained to in the course of the one life.

PERFUMES, fragrant odors or substances which are manufactured to emit them. They may be natural or artificial. Natural perfumes are plant products except musk, ambergris, and civet. Flowers for perfumes are grown at Grasse near Cannes—*e.g.*, violets, jonquils, roses, orange-flowers, thyme, rosemary, myrtle, tube-roses, jasmine, lavender, geranium. The 'otto' or fragrant principle is obtained by pressing, extraction with a solvent, distillation, maceration in melted fat, or 'enfleurage'—*i.e.*, absorption by cold fat.

Analysis of perfume essences has been followed by the artificial compounding of perfumes; thus essence of jasmine has been made. Partially or wholly synthetic perfumes are now elaborated—*e.g.*, oil of bitter almonds is benzaldehyde; oil of wintergreen is methyl-salicylate; white lilac scent is terpineol, made from oil of turpentine; artificial violet perfume is ionene, made from oil of lemons.

PERGA (37° N., 30° 55′ E.), ancient city, Asia Minor seat of worship of Artemis; visited by St. Paul.

PERGAMUM, PERGAMUS (modern *Bergama*), ancient city of Mysia; known from beginning of V. cent. B.C. Philetaerus, a eunuch, seized treasures of P and founded small kingdom 283. Attalus I., who succeeded 241, took title king, with three successors preserved friendship with Rome; Attalus III. (*d.* 133 B.C.) left P. to Romans. P. became capital of Rom. province, Asia, and was one of the Seven Churches. Excavations 1878-86 revealed fine sculptures.

PERGOLA, the name given to a balcony, or arbor, or trellis. In its original meaning it is an arbor or trellis work covered with vegetation or flowers. The term is commonly given to a veranda or balcony projecting from a house.

PERGOLESI, GIOVANNI BATTASTA, PERGOLESE (1710-36) Ital. composer; studied at Naples under Greco and Durante; composed two masses for double chorus, *Stabat Mater*; operas, *La Serva Padrona, La Sallustia, L'Olimpiade,* etc.

PERCUSSION CAPS, small copper cylinders, which hold a detonating powder, *e.g.*, a mixture of fulminate of mercury with potassium chlorate. These can then be exploded by percussion, and so are used in firearms.

PERIANDER (ruled, 625-585 B.C.), tyrant of Corinth, and one of *Seven Sages of Greece*; destroyed possible rivals, and made Corinth famous.

PERICARDIUM. See HEART.

PERICARP, in botany, the seed vessel of a plant, or the whole case or cover in which the seed is enclosed.

PERICARDITIS, INFLAMMATION OF THE PERICARDIUM. See HEART.

PERICLES (499-429 B.C.), Athenian statesman of 'golden age'; descendant of Alcmaeonidae; attended lectures of Anaxagoras, Protagoras, and Zeno, and acquired powers of oratory and cultivated well-balanced mind. On death of Aristides, *c.* 468, P. assumed leadership of democrats against oligarchic party under Cimon, but stooped to no demagogic arts; supreme after banishment of Cimon, 461. He and Ephialtes took judicial power from Areopagus and council of 500 and gave it to *dicastai*, chosen from citizens, who received small payment. The P. age was a time of tremendous activity; Athenian Empire was extended; seat of Delian League was transferred from Delos to Athens, but in 445 Athens was forced to abandon to Sparta claim to hegemony over Greece on land; Thucydides was exiled, 443, for attack or imperial policy. During 'the age of P.' a new town was built at Peiraeus; glorious temples and theatres (Parthenon, etc., see ATHENS) were raised by architects, Ictinus, Callicrates, Coraebus, and Mnésiclés, and adorned by Phidias the sculptor and Polygnotus the painter; Sophocles and Euripides wrote their plays. The terrible Peloponnesian War broke out, 431; already the threat of storm had caused exile of Anaxagoras and death of Phidias and Aspasia, P's. brilliant mistress; nevertheless P. conducted resistance to siege, 431-430; one of the world's greatest and noblest statesmen.

PERIDOTE, gem-stone, variety of green olivine; transparent; shades of olive or leek green; found in Brazil, Ceylon, and Egypt; soft and difficult to polish.

PERIDOTITE, group of basic plutonic rocks of deep-seated origin; colors—mostly dark; several varieties, including dunites (which contain much olivine, and are granular); others contain augite, hornblende, or biotite; named after mineral they contain as hornblende-peridotite, etc.

PERIER, CASIMIR PIERRE (1777-1832), Fr. statesman and banker; criticised financial policy at Restoration; minister, 1831, and established the *juste milieu* between conservatism and democracy; descendants took name Casimir-Périer.

PERIGEE, point in the orbit of the moon, which is at least distance from from the moon.

PÉRIGORD, former province of Fr. now forms department of Dordogne and part of Gironde; old capital, Périgueux.

PÉRIGUEUX (45° 11′ N., 0° 44′ E.), town, on Isle, France; capital of Dordogne department; has St. Front cathedral 984-1047, and fine Rom. remains (baths, aqueduct, etc.); woolens, ironware, furniture, etc.; famous Patés de Périgueux. Pop. 28,300.

PERIHELION, point of the earth's orbit in which it is nearest the sun.

PERIM (12° 38′ N., 43° 20′ E.), small Brit. island in Strait of Bab-el-Mandeb; coaling station.

PERIM, PIRAM (21° 38′ N., 72° 24′ E.), island, in Gulf of Cambay, India.

PERIMETER, in geometry, is the sum of the bounding lines of a figure, *e.g.* the P. of a triangle with sides 4, 5, and 6 in. respectively is 15 in.

PERINAEUM, that part of the body included in the outlet of the pelvis. It is bounded in front by the pubic arch, at the rear by the coccyx, and at the side by the tuberosities of the ischium. The region is occupied by the lower portions of the rectum, urethra, and the root of the penis.

PERINTHUS, HERACLEA PERINTHUS (40° 57′ N., 27° 58′ E.), ancient city, on Propontis, Thrace; modern Eski Eregli.

PERIOD AND PERIODICITY.—The word 'period' is often used in a limited sense to denote a definite length of time, *e.g.*, a period of history. In its wider sense it denotes a continuous cycle of events which continually repeat themselves in a definite order. Thus, take three events, A, B, and C: A always occurring before B, and B before C, and then A, B, C, again. The time, say, which elapses between the performance of A and its next performance is called the period of the events, which are termed *periodic*. Thus the succession of days may be termed periodic, the beating of the heart, and breathing, may also be termed periodic. The revolution of the astronomical bodies is treated as periodic.

PERIODICALS. While newspapers are concerned with the news of the moment, periodicals, which include magazines and reviews, are chiefly devoted to reading for the entertainment or instruction of their readers. The *reviews*, one of the earlier forms of the magazines, are mainly of a literary, political, and critical character. In the pioneer journals, as in those of the present day, were found the contributions of eminent writers who found in their pages a convenient medium for the expression of their views. Reviews stand in a class by themselves, and as a rule leave the lighter forms of literature to the magazines. In the latter a great development has taken place.

In the field of illustrated magazines

the United States early took a pre-eminence which it has never lost. Scribner's, Harper's, and the Century have since their foundation represented the highest type in this field of literary endeavor. Other periodicals more resembling the English reviews, such as the Atlantic Monthly, North American Review and the Yale Review are also of a high standard. Late in the 19th century Frank A. Munsey, with Munsey's Magazine, started the movement for cheap, illustrated periodicals. This was followed by a host of magazines selling for the most part at ten cents. For a time these were very successful but the development of the Sunday newspaper, which in itself is really a magazine, cut away the ground from many of these, so that radical readjustments in price and character were necessary. Some of these magazines which had heretofore been devoted almost entirely to fiction entered special fields which gave more attention to general matter than to fiction. The weekly illustrated periodical, with the single exception of the Saturday Evening Post, has not been remarkably successful in the United States. Harper's Weekly was the most famous of these and for many years it had a successful life, but finally conditions had so changed that it was no longer possible to publish it at a profit and it was suspended. A somewhat similar fate overtook Leslie's. The history of the Saturday Evening Post is one of the most remarkable in the publishing history of the United States. Selling at five cents, it has attained a circulation of over 2,000,000.

Perhaps the most remarkable development of periodical publishing in the United States has been the wonderful growth of magazines devoted to the interests of women. These include the Ladies' Home Journal, Woman's Home Companion, Pictorial Review, and Good Housekeeping, all of which have reached a circulation of 500,000 or more. Magazines devoted to outdoor life have also been successful. Among the most notable of these are Country Life, House and Garden, Town and Country, The House Beautiful, and the Garden Magazine. Technical periodicals occupy a field by themselves. Nearly every branch of science, art and business is represented in the United States by its own periodicals, some of which are of great size and considerable circulation. Of magazines devoted to criticism and literature, there have been many but few have reached an advanced stage. Among the best known of these was the Critic, which, under the editorship of Jeanette and Joseph B. Gilder, was long the best written organ of literature. The Bookman is one of the oldest and best of literary magazines. Periodical publishing in the United States is one of the greatest industries, and the American public is, as a whole, a magazine reading public.

PERIOECI, ancient Laconian tribe; occupied mountainous country; unlike Helots, they were free, but had no voice in government; subject to Spartiates, who oppressed them.

PERIOSTEUM. See BONE.

PERIPATETICS, name given to Aristotle's disciples, supposedly from his habit of walking to and fro as he lectured. The chief P's were Theophrastus, Eudemus, Dicaearchus, Critolaus, and Strato of Lampsacus. This school retained its influence longer than any other school of antiquity, and gave to the Church a more effective means of regulating the scholastic philosophy.

PERIPATUS (Class *Onychophora*; amongst Arthropods), caterpillar- or worm-like Arthropods, with beautiful brown or dark green velvety skin and long body borne on from seventeen to forty-three pairs of dumpy, unjointed legs; of great interest as forming a link between Arthropods and Worms.

PERISCOPE, an instrument which consists of a revolving prism, capable of reflecting the rays from any part of the horizon down a vertical tube. It is an indispensable part of the submarine, and during the World War, was also generally employed to watch an enemy from a trench.

PERISTALSIS. The involuntary undulation of a muscular tube which propels the contents in a particular direction. The term is most commonly used in connection with the lower intestines of the animal body, but peristalsis occurs from end to end of the alimentary canal, beginning at the gullet and ending at the rectum. The movement consists of a series of muscular contractions and relaxations, producing a wave-like motion, which forces the food, or other matter along the tube. Peristalsis may continue for a short time after death. Under certain conditions 'anti-peristalsis' may occur, the contents of the intestines being forced into the stomach, or the contents of the stomach into the gullet.

PERISSODACTYLA, ODD-TOED UNGULATES, a sub-order of *Ungulata*, comprising Tapirs, Horses, and Rhinoceroses. They are characterised by the presence of an odd number of toes in each foot, except in the fore-feet of Tapirs, where there are 4 digits: but in

all cases the middle or third digit is larger than the others, and lies in line with the central axis of the limb as a whole. The middle digit is usually accompanied only by the second and fourth; the first is never present in living forms.

PERITONITIS, inflammation of the peritoneum, or lining membrane of the abdominal and pelvic cavities, which may be localised or diffuse. It is caused by various micro-organisms, and an attack is usually brought on by exposure to cold or wet, general debility, or is associated with injury or disease of some abdominal organ. *Acute diffuse p.* is characterised by persistent vomiting, pain and tenderness in the abdomen, which is usually swollen because of the distended intestines, while there is generally constipation. The temperature is raised and the pulse rapid. The abdominal muscles are rigid, and the patient lies with an anxious expression and his knees drawn up. If the p. is due to sudden perforation of a hollow organ there is profound shock at first, recovered from three or four hours later.

Acute localised p. may be suppurative or non-suppurative, and occurs in lesions when the peritoneal cavity has been shut off by fibrinous adhesions between the intestines and other parts.

PERIWINKLE, OR WINKLE (*Littorina*), a genus of pectinibranchiate gasteropods found on most shores, where they feed on marine vegetation. Some occur at low-water mark, and others on rock where the sea rarely reaches them. The common P. (*L. littorea*) is a popular article of diet.

PERIWINKLE (*Vinca*); a genus of hardy perennial plants and stove evergreen shrubs (order Apocynaceae). The large P. (*V. major*) and the lesser P. (*V. minor*) are handsome blue-flowered plants of considerable value for adorning shady positions in gardens.

PERJURY is false swearing, at a judicial proceeding, and before a competent authority, by a person knowing it to be false. It must be material to the case being tried, that is, it is p. when the false swearing is explanatory of the case.

PERKIN, SIR WILLIAM HENRY (1838-1907), Eng. chemist; pupil of Hofmann; prepared aniline black and mauve 1856, by oxidising aniline, laying foundation of coal-tar color industry; condensed aldehydes with fatty acids; studied magnetic rotation.

PERKINS, GEORGE WALBRIDGE (1862-1920), American financier; *b.* in Chicago, January 31, 1863; *d.* in Stamford, Conn., June 18, 1920. He was employed by the Chicago office of the New York Life Insurance Company in 1877, and after serving as book-keeper, cashier and superintendent of the western department, became 3rd vice-president in 1892; 2nd vice-president in 1898; chairman of the finance committee in 1900, and vice-president in 1903. From 1901 to 1910 he was a partner in the firm of J. P. Morgan & Company. He was also director of the International Harvester Company; president of the Interstate Park Commission, and director in various industrial corporations. In 1912 he backed Theodore Roosevelt and the Progressives and in 1915 opposed their joining the Republican party.

PERKINS, LUCY FITCH, Author, illustrator; *b.* in Maples, Ind. In 1889 graduated from a school in Boston. From 1887-1891 a teacher in School of Fine Arts, Pratt Institute, Brooklyn, Author and Illustrator of: *A Book of Joys,* 1907; *The Goose Girl, Cornelia, The Dutch Twins, The Japanese Twins, Thr Irish Twins* and others of the series. Editor and Illustrator of Dandelion Classics. Illustrated many other books.

PERLIS. See MALAY STATES.

PERLITE, PEARLSTONE, glassy volcanic rock of pearly lustre; consists of silicate of aluminum, iron, lime, and alkali in varying quantities; occurs in spherules.

PERM, government of Russia, eastern part of which lies in Siberia; area, *c.* 128,200 sq. miles; Ural Mts. cross government from N. to S.; much of the surface covered by forests; chief rivers are Kama, Tobol, and Pechora; capital, Perm; P. is rich in mineral wealth, producing iron, silver, copper, platinum, nickel, lead, manganese, rare metals, and precious stones. Leading industries are agriculture, cattle-rearing, and mining. Pop. *c.* 4,000,000.

PERM (58° 1′ N., 56° 32′ E.), riverport, on Kama, chief town of P. government, Russia; tanneries; transit trade. Pop. 48,800.

PERMANENT BOARD OF INTERNATIONAL JUSTICE, an advisory body established in 1921 by the League of Nations, which adopted the draft of its proposed constitution framed by the Advisory Committee of Jurists who met at The Hague in that year, but modified the plan in so far as it related to obligatory jurisdiction. As sanctioned by the League, the jurisdiction of the Court comprises all cases which the parties concerned may refer to it. The issues recognized as suitable to its arbitration embrace points arising from the inter-

pretation of a treaty; any question of international law; the existence of any fact which, is established, would constitute a breach of any international obligation, and the extent and nature of the reparation for such breach. The League of Nations Covenant contains no provision that compels members of the League to submit disputes of the nature specified to arbitration.

The Court is composed of eleven regular or titular judges and four deputy judges, who were elected in September, 1921, by the Council of the League. The regular judges appointed were Rafael Altimira y Crevea (Spain); Dionesio Anzillotti (Italy); Ruy Babosa (Brazil); Antonio Sanchez de Bustamante y Sivren (Cuba); Robert Bannatyne, Viscount Finlay (Great Britain); Bernard C. J. Loder (The Netherlands); Yorozu Oda (Japan); Charles Andre Weiss (France); John Bassett Moore (United States); Didrik Galtrup Gjedde Nyholm (Denmark); and Max Huber (Switzerland). The four deputy judges elected represented Rumania, China, Jugo-Slavia and Norway. The ordinary judges receive salaries varying from $6,030 to $14,070 according to the length of the sessions.

The Court first met in June, 1922, heard three cases calling for interpretation of the Treaty of Versailles relating to labor problems and delivered advisory opinions bearing thereon. After its creation, Charles Evans Hughes, U. S. Secretary of State, announced publicly that the American government would recognize the International Court as soon as suitable arrangements could be made for American participation in the election of judges, which were made by the League of Nations, a body the United States had refrained from joining. In February, 1923, the Harding administration revealed its desire that the United States became associated with the Court in a message the President addressed to the Senate. He pointed out that the United States in the past had taken an active part in advocating the establishment of such a tribunal, which was actively functioning as an agency of International peace and readjustment. Strong and determined opposition against American adherence to the Court because of its organization under the auspices of the League of Nations, and in answer the President declared that association with the Court did not mean entrance into the League. He described the tribunal as an established institution of high character. American participation was contingent upon the United States through designated representatives being permitted to be on an equal footing with other members of the Council and Assembly of the League of Nations in all proceedings for the election of judges to the Court, and was also conditional upon the statute creating the Court not being amended without the consent of the United States. The President's proposal involved a treaty or protocol requiring the Senate's approval, and the matter was deferred for consideration to the new session of Congress opening in December, 1923.

PERMANGANATES.—The principal salt. potassium permanganate, $KMnO_4$, is prepared by acidifying the green solution of potassium manganate, obtained by fusing manganese dioxide and caustic potash in air, when the liquid turns red, and on evaporation yields purple crystals. Potassium and sodium permanganates are used technically for the oxidation of compounds in organic preparations.

PERMIAN, series of strata which, in U. K., rest unconformably on the Carboniferous system; grouped as follows: Upper Red Sandstone; Magnesian limestones; Marl Slate; Lower Red Sandstone and Mottled Sandstone.

PERNAMBUCO (9° S., 39° W.), state, N.E. Brazil; area, 49,574 sq. miles; surface broken and mountainous; fertile and wooded district along coast; chief river, San Francisco; capital, Recife (or Pernambuco). First settlements were made XVI. cent. P. has been scene of many revolutions. State is chiefly agricultural; sugar, coffee, cotton, tobacco, and fruits cultivated; manufactures, cotton, sugar, rum and cigars. Pop. 1920, 1,975,441.

PERNAU, PERNOV (58° 22′ N., 24° 34′ E.), seaport, watering-place, Russia; exports flax. Pop. 20,000.

PÈRONNE, town, Somme, France (49° 55′ N., 2° 56′ E.), 22 m. S.S.W. of Cambrai. Charles the Simple imprisoned in the castle, 923-9; Louis XI. forced to sign treaty with Charles the Bold, 1468; captured by Wellington, 1815; and by Germans, 1817. In the World War was occupied by Germans during race to the sea (Sept. 1914). In first battle of Somme the French came within 2 m. of it on the W.; but on the N., where the town is guarded by Mont St. Quentin, they were held up beyond the Tortille stream. Occupied by Allies during Ger. retreat to Hindenburg Line (March 1917); recovered by enemy in great Ger. offensive of March 1918; finally captured during Allied advance (Sept. 1918). Pop. 4,600.

PEROXIDE, the general name given to the binary compounds of oxygen, con-

taining the greatest amount of that element. See HYDROGEN.

PERPETUAL MOTION, generally used with reference to a machine which, when once set in motion, will continue moving for ever without assistance from any outside source of energy. Much ingenuity has been expended upon the problem of constructing such machines, but with establishment of the principle of the conservation of energy the impossibility of a perpetual motion has been realized. The initial energy of a perpetual motion machine is gradually used in overcoming resistance and friction, and therefore the machine must stop after a time if no further energy is imparted to it. If all friction and resistance could be avoided, a body such as a simple pendulum or a spinning top would retain for ever motion given to it, but only on condition that it was not made to act on other bodies—that is, to do any work; so that even if practicable, it would be of no utility.

PERPIGNAN (42° 43′ N., 2° 53′ E.), town, Pyrénées Orientales, France; strongly fortified; has cathedral dating from XIV. cent.; trades in wine, brandy, silk, wool. Pop. 1921, 53,742.

PERRAULT, CHARLES (1628-1703), Fr. author; started in 1687 the *Guerelle des Anciens et des Modernes* with his poem, *Siecle de Louis le Grand*; best known by his *Contes* 1697, including *Tom Thumb, Puss in Boots, Blue Beard, Little Red Riding Hood, Cinderella, The Sleeping Beauty,* taken from the Tales of Mother Goose (*Contes de ma mere l'oie*); exquisite style, simple, sententious, and witty.

PERRAULT, CLAUDE (1613-88), Fr. architect; *b.* of Charles P.; introduced Palladian architecture into France; architect of Louvre; trans. Vitruvius, 1673.

PERROT, SIR JOHN (*c.* 1527-92), lord deputy of Ireland 1584-88;

PERRY, BLISS (1860), an American university professor and writer, *b.* in Williamstown, Mass. He graduated from Williams College, in 1881, studied abroad and later became professor of English at Williams College, and, after 1893, at Princeton University. During 1899-1909 he was editor of the Atlantic Monthly Magazine. Since 1907 he has been professor of English at Harvard University. Among his writings are *The Broughton House,* 1890; *The Plated City,* 1895; *The Powers at Play,* 1899; *A Study of Prose Fiction,* 1902; *Walt Whitman,* 1906; *The American Spirit in Literature,* 1918 and *Life and Letters of Henry Lee Higginson,* 1921.

PERRY, LAWRENCE (1875), Journalist, Author; *b.* at Newark, N. J. Educated at public and private schools. On city staff of New York papers from 1897-1904, 1904-05 and 1906. Editor of a yachting magazine from 1906-10, and a New York Post from 1912-20. Since 1920 editor of a press association. Author of: *Dad Merrithew,* 1910; *Prince of Chauffeur,* 1911; *Holton of the Navy,* 1913; *The Fullback,* 1916; *The Big Game,* 1918; *Our Navy in the War,* 1918; *The Romantic Liar,* 1919; *For the Game's Sake,* 1921. Wrote short stories for magazines and also articles.

PERRY, MATTHEW GALBRAITH (1794-1858), Amer. commodore; *s.* of Christopher Raymond P., 1760-1818, whose five sons all won distinction in navy; fixed spot for colony of Liberia, 1819; advocated use of steam instead of sailing ships in war; made commercial treaty with Japan, 1854.

PERRY, OLIVER HAZARD (1785-1819), an American naval captain, who held various commands during the war on the lakes. He had charge of the Lake Erie squadron, and defeated Captain Robert Barclay—who had served with Nelson—at the battle of Lake Erie. He took an important part in the operations of Detroit, and at the battle of the Thames. He was honored by the thanks of Congress.

PERRY, ROLAND HINTON (1870), an American painter and sculptor, *b.* in New York City. After a private education he studied at the Ecole des Beaux Arts, in Paris. Among his works in sculpture are a bas relief, 'The Sibyls,' in the Library of Congress, in Washington; the sprandrels on the Dewey Arch in New York, 1899; the frieze of the New Amsterdam Theatre, in New York, 1903; a statue of Dr. Benjamin Rush, in Washington, D. C., 1904; the group of the New York State monument for Lookout Mountain, Tenn. 1907, and the soldier monument 'The Rock of the Marine,' in Syracuse, N. Y., 1920. He has painted portraits since 1916.

PERRY, THOMAS SERGEANT (1845), Author; *b.* at Newport, R. I. In 1866 graduated from Harvard College. Author of: *Life and Letters of Francis Lieber,* 1882; *English Literature in the Eighteenth Century,* 1883; *From Opitz to Lessing,* 1884; *The Evolution of the Snob,* 1886; *Library of Adventure* (with William Dean Howells), 1886; *Greek Literature,* 1890; *John Fiske,* 1905.

PERSECUTION, the attempt to suppress obnoxious opinions, chiefly in the field of religion, by temporal punishment, carried usually as far as the death

penalty. During the first days of Christianity, the Christians underwent much P. from the Jews, and the Roman government also visited them with much severity. The number of P's suffered under the Roman emperors is usually somewhat artificially reckoned as ten: under Nero, 64 A.D.; Domitian, 95; Trajan, 107; Hadrian, 195; Marcus Aurelius, 165; Septimius Severus, 202; Maximinus, 235; Decius, 240; Valerianus, 257; Diocletian, 303. Others omit Hadrian and insert Aurelian, 275. When Christianity became state religion there was much P. of the Catholics by the Arians, and by the Catholics of the various heretical sects. In the middle ages P. was freely used as a weapon against the spread of heretical opinions, as in the case of the Cathari and Albigenses. The Protestant reformers used the same method. The case of Servetus at Genoa, and of the Quakers in New England, are classic examples. The Jews (*q.v.*) have suffered severe P's throughout Europe at different times, and it is met with in almost all missionary endeavors.

PERSEPOLIS, ancient city, former capital of Persia, situated in Kur Valley, *c.* 40 miles from Shiraz; now a great series of ruins, finest being those of Takhti Jamshid, or Throne of Jamshid; behind Takhti Jamshid and at Nakhshi Rustum, some miles distant, are sepulchres cut out of rock—buildings thought to have been begun under Darius I., and added to by other Achaemenidae; believed to have been taken and palaces burned by Alexander, after which city gradually fell into decay.

PERSEUS, an ancient N. constellation (between Taurus and Cassiopeia), rich in astronomical interest. In the head of Medusa (in the left hand of Perseus) is the well-known short period variable Algol or B Persei. Its changes from magnitude 2-3 to 3-5 are repeated regularly after a period of two days, 20 hours, and 49 minutes. *a*Persei, the brightest in the constellation, is a star of the solar type, its magnitude being 1.9. The Perseid meteors are swarms of meteors moving around the sun in a retrograde and elongated orbit which intersects the earth's orbit each year on Aug. 10, causing a shower of shooting stars.

PERSEUS (classical myth.), *s.* of Zeus and Danaë; with enforced aid of the Graciae and Nymphs, slew the Gorgon Medusa, thereby rescuing Andromeda, whom he married; turned Polydectes of Seriphus into stone by means of the Gorgon's head. P. is the subject of many and conflicting legends; worshipped as a hero.

PERSHING, JOHN JOSEPH (1860), American general; *b.* Linn County, Mo. He graduated at the United States Military Academy in 1886, entered the army in the same year as second lieutenant in the Sixth Cavalry and saw active service in the Apache Indian campaigns in New Mexico and Arizona. He was active also against the Sioux 1890-91, and in the latter year was appointed military instructor in the University of Nebraska. In 1897 he was made instructor in military tactics at West Point. He took part in the Spanish-American war and later was transferred to the Philippines where he did remarkable work in the subjugation of the Moros, showing not only military but diplomatic qualities of a high order. For his work there he was made brigadier general in 1906. Following some years spent in routine duties, he was appointed in 1915 to head the punitive expedition against the Mexican Villa. His life was shadowed about that time by the loss of his wife and three children in a fire at San Francisco, one boy alone surviving. At the outbreak of the war between the United States and the Central Powers, General Pershing was chosen as commander in chief of the American Expeditionary Forces. He was made full general in October, 1917, being the fourth American officer to hold that rank since Washington. His leadership of the American forces in the war earned him the gratitude of his country and the encomiums of the Allies. An outstanding feature was the prompt placing of the American forces at the disposition of Marshal Foch at a critical epoch of the great German drive in March, 1918. He received the highest military honors and decorations in the gift of Allied Governments, and was publicly thanked and presented with a gold sword by Congress. In 1921 he became Chief of Staff of the Army.

PERSIA, OR IRAN, country, S.W. Asia (25°-40°N., 44°-63° E.); bounded N. by Turkestan, Caspian Sea, Azerbeijan, and Armenia, E. by Afghanistan and Baluchistan, S. and S.W. by the Gulf of Oman and the Pers. Gulf, and W. by Mesopotamia and Kurdistan.

In the N. is the great range of the Elburz, with many peaks over 12,000 ft. high (Demavend 18,600 ft.); along the S.W. are a series of parallel ranges, the Zagros Mts., ruhning N.W. and S.E., with peaks of from 10,000 to 13,000 ft.; the rest of the surface, in the centre and also the W., is dry, barren plateau of Iran (6,000 to 8,500 ft.). The whole district from mountains to mountains, S.E. of Teheran, forms the Dasht-i-Kavir or Great Salt Desert and Dasht-i-

Lut, of height of *c.* 2,000 ft., and covered with thin deposits of saltpetre. Owing to the position of the mountains, sends merely short streams, the chief being the Karun, flowing to the Shatel-Arab, at N. of Pers. Gulf.

Geologically the land has not been extensively surveyed, but Lower Oolite, Cretaceous, volcanic, and metamorphic rocks have been observed. The climate varies extremely, but on the plateaus is generally one of extremes, very hot from May to Oct., very cold during other months. The fauna includes lions, leopards, bears, wolves, jackals, hyenas, antelopes, wild sheep and swine, the wild ass, and mountain goat; the Pers. horse (expecially when crossed with the Arab) and the camel are valuable. Vegetation is most luxuriant on the coast, where flowers, especially roses, grow in great profusion, and the date palm is widely spread. There is little timber, the forest district being mainly confined to N. slope of the Elburz, but there are numerous varieties of shrubs. The orange, lemon, olive, almond, gum-trees, pomegranate, fig, mulberry, vine, rice, cotton and tobacco plants, sugar, a much-valued wheat, and the usual cereals are found.

The inhabitants are chiefly agricultural and pastoral, and are very thinly distributed. Large quantities of wheat, barley, rice, fruits, asafoetida, gums, hashish, tobacco, opium, silk, wool, lambskins, goat's hair, and cotton are produced. The wool of Khorassan is equal to that of Astrakhan. Hand-manufactures of carpets, felts, shawls, silk, cotton, prints, leather, copper, brass-ware, enamelled work, pottery, glazed tiles, and attar of roses, and dealing in pearls and pearl-shell are important. Minerals are abundant, but most of them are still unworked, the distance from markets and the bad communications rendering the transport of them unwrought impossible, while scarcity of fuel prevents treatment on the spot. Lead, copper, and turquoise (near Nishapur) are worked; silver-lead, iron in large quantities, coal (especially in the S.E.), tin, antimony, manganese, borax, salt, and naphtha (all along W. and in part of N.), are found. Oil worked by the British promises to bring much profit. The imports are chiefly cottons, sugar, tea, iron and steel goods, yarn, petroleum, rice, and flour.

Inhabitants.—Native elementary education is poorly supplied by the schools of the larger towns, but secondary instruction is fairly good; westernization commenced with the polytechnic established in Teheran in 1849; majority of pop. learn only to read the Koran. There are about 8,500,000 Shiite Mohammedans, about 850,000 Sunnites, 50,000 Armenians, 40,000 Jews, 30,000 Nestorians, and 10,000 Parsis. The principal ecclesiastic, the Mujtahid of Kerbela, has great authority under the Shiite creed; all the chief priests are called mujtahids, the simple priests mullas; their appointment belongs to the Church, but the state elects the Church officials, Sheikh-ul-Islam and Imam-i-Jum'ah. Persians are usually tolerant to non-Mussulmans, but are subject to fanatical outbursts. About a quarter of the inhabitants are nomads, the chief nomadic tribes being Turks, Kurds, Leks, Arabs, Lurs, Baluchis, and gipsies.

The chief towns are Teheran (cap.), Tabriz, Ispahan, Meshed, Kerman, Yezd, and Shiraz; the principal ports, Bander Abbas, Bushire, Lingah, and Mohammerah on the Pers. Gulf, Astara, Bender-i-Gez, Enzeli, and Meshed-i-Sar on the Caspian Sea. There is a railway from Teheran to Shah Abdul-azim (6m.) and one constructed by a Russian company from Julfa (Perso-Russian frontier) to Tabriz (97 m.). Under the new Anglo-Pers. agreement (see below) Brit. experts are to co-operate in the development of transport. Road-making has been busily carried on in recent years, with the result that, beside the caravan routes and old roads from Teheran to Kom and Resht, there are now roads from Tabriz to the N. border, Kazvin to Hamadan, Meshed to Askabad, etc. The Pers. Road and Transport Co., a Brit. firm, was formed in 1903. A state Dep. of Posts and Telegraphs originated in 1909; there are 6,312 m. of telegraph line. Area, 628,000 sq. m.; pop. (est.) 10,000,000.

Government of Persia was until 1906 a despotism exercised by the Shahan or Shahin Shah (Pers. 'king of kings'), who was, however, unable to act against the precepts of the Koran or the traditions of Shiite Mohammedism. The Great Council, or Mejlis, has ceased to exist as a legislative or administrative body since 1915. The government is in hands of the cabinet of eight ministers. Gov.-generals (Hakim, Wali, etc.), always royal or noble, govern the provs. (33 in number) and appoint their own deputy-governors in the subdivisions of the same. The municipalities have a chief official known as Beglerbegi-Darogha, or Kalatnar; the village reeves are called Kedkhoda. A law of May 1907 provides for the election of rural and town councils. The nomad tribes are outside this system, but their chiefs are accredited officials of the central government. Justice is based on the Koran, and is carried out by the Hakim (who are reputed extremely unjust and extortionate) assisted by the priests.

History.—Our knowledge of early

Pers. history is mainly derived from the Greeks. An agricultural and pastoral Aryan race, Zoroastrians and fire-worshippers, seems to have settled in Persia (Pers. *Fars*) S.W. of the Iranian plateau. The N.W. was occupied by the kindred race of Medes, and the Persians probably underwent Assyrian and Babylonian subjugation before becoming vassals of the Medes *c.* 720 B.C. Nearly three centuries later Cyrus the Great (Pers. *Kai-Khusru*) overthrew the Median yoke, and after defeating King Astyages (*c.* 550), founded the famous Pers. dynasty of the Achaemenides, which lasted until 330 B.C. Their cap. was first Pasargadae, then Persepolis. His *s.* Cambyses 529-522 conquered Egypt; Darius I., *Hystaspes* 521-485, conquered Babylon 517. Under Darius one of the greatest conflicts between E. and W. commenced. Darius conquered Ionia, Thrace, and Macedonia, and threatened Greece, but was forced to retreat after his repulse at Marathan 490. His *s.*, Xerxes I. 485-464, after recovering Egypt, for long henceforward a Pers. prov., in 484 again invaded Greece, and was defeated at Thermopylae and Salamis, 480; Plataea, 479; and lost many of his Ionian towns. Artaxerxes I. 464-424 was succeeded by his *s.* Xerxes II., under whom the satraps who governed the various Pers. provs. began to assert their independence. He was deposed by Darius II. 424-404, no more successful than himself. His *s.*, Artaxerxes II. 404-361, won a great victory over his insurgent *b.* Cyrus, the younger, at Cunaxa 401, after which the 10,000 Greeks who had aided Cyrus made their famous retreat under Xenophon; the long, terrible journey through hostile country is immortalized in Xenophon's *Anabasis*. Artaxerxes III. 361-337 recovered Egypt, which had again seceded.

The empire was overthrown under Darius III. 336-331 by Alexander the Great, who won great victories at the river Granicus 334 and Issus 333, where Darius and his queen were captured crossed the Tigris and Euphrates, won the battle of Arbela, 331, and overthrew for ever the empire of the Achaemenians. Over all this region, as far as India, Hellenic influence was established, and can still be traced. Darius was murdered by Bessus in 330. His realm, which had become a prov. of the Macedonian Empire, broke away again after Alexander's death, 323.

Persia without Egypt was assigned to the satrap Seleucus Nicator, founder of the Seleucid dynasty, who ruled over nearly the whole realm of the old Achaemenides. In the middle of the 3rd cent. B.C., however, Bactria (which is said to have included a large part of India) and Parthia broke away, becoming independent states, and Parthia under Arsaces I. subjugated Persia. The Arsacid dynasty, hated by the Persians, was overthrown by the native Sassanid line. Ardashir Babegan, *g.s.* of Sassan, won Fars, Kerman, and part of Irak, and the final victory of Hormuz (A.D. 218). The Middle Pers. dynasty of the Sassanidae protected the country for long against her two chief enemies—Rome on the W., Turkey on the E.; and Persia was propserous and renowned under Sapor I. (240-71), Sapor II. 309-80, who showed great rigor towards Christians; Chosroes I. 531-78 and Chosroes II. 590-628, who conquered Syria (storming Jerusalem in 614), subdued Asia Minor and Egypt, and threatened Constantinople, saved by the victory of the Emperor Heraclius in 628. After his murder, by his *s.* Siroes, the realm fell into disorder. The last Sassanid king, Yazdigird III., lost Persia to the Arabs by battle of Kadisiya, 635.

Persia then became a prov. of the caliphate, and when Bagdad was built, in the middle of the 8th cent. by Al-Mansur, it became the cap. of the Abbasid Empire. Under the nominal suzerainty of the caliphs the local dynasties of Taharides 820-72, Saffarides 869-903, Samanides, and Ghaznevids won fame. Finally, in 1055 the Seljuk Turks under Togrul Beg united Persia under one rule. After their decline it was conquered by Mongols under Jenghiz Khan, 1223, and experienced great miseries under Hulagu Khan and his successors the Ilkhanians, 1256-1366. In 1399 the Mongols were driven out by Timur and his Tatars, who, a hundred years later, were expelled by the Uzbeg Turks.

The Shiite dynasty of Sufi was established in 1499, and lasted until 1735. Ismail I., who introduced Shiism as the state religion, drove the Uzbegs back beyond the borders of Khorassan and conquered Georgia, but was defeated in his attempt at a holy war against Turkey. The greatest of the line was Abbas I. 1586-1628, under whom Ispahan was made the capital. Afghanistan was driven by persecution to revolt 1709; in 1722 the Afghans captured Ispahan; and in 1736 the Turks deposed the last shah (Pers. king) of this line. The Turk. Nadir Shah, 1735-47, ruled tyrannically over Persia, and under his successors the various states revolted, Afghanistan and Baluchistan becoming finally independent.

The rest of Persia was reunited in 1795 by Aga Mohammed, a Turkoman eunuch, who deposed Lutf Ali Khan and founded the Kajaran dynasty, Teheran becoming the new capital.

After his death, in 1797, Georgia was again separated, becoming in 1802 a Russian prov., and Persia was forced 1813 and 1829, to cede to Russia everything N. of the Aras, the present boundary. Attacks on Brit. power in N.W. India 1836-8 and 1856-7, signally failed, and Persia has since sunk into a protected state. The boundary with India was fixed by a Brit. commissioner in 1872. See MAP ASIA.

During the reign of Muzaffaruddin 1896-1907, court corruption and misrule led to the demand for a constitution, which was granted in 1905, and guaranteed by Mohammed Ali Mirza, who succeeded. The new shah soon came to blows with the nationalist party. In 1908 martial law was proclaimed and the constitution abolished; but the nationalists took to arms, wrested from the monarch a new constitution, and deposed him in 1909 in favor of his *s.* Ahmed Mirza (*b.* Jan. 20, 1898). Meanwhile Persia was distracted by attacks of Turks and Russians, and revolts within her own frontiers. In 1907 Russia and Great Britain made a treaty, marking out their respective spheres of influence, and guaranteeing Persia's independence and integrity. The Shah was crowned on July 21, 1914. The weakness of Persia prior to the World War made the country a happy hunting-ground for Ger. intrigue. Until the collapse of Russia, Russian troops operated in Persia and saved Teheran and the Shah's throne. In March 1916 Sir Percy Sykes landed at Bandar Abbas for the purpose of raising a force to replace the mutinous gendarmerie, which was officered by Swedes. many of whom joined the Germans. Within two years he raised a force of 6,000 men. With this force and Ind. troops, despite innumerable difficulties, including a siege of four weeks' duration by the Kashgai under Ismail Khan, he preserved S. Persia from anarchy. At the Peace Conference Persia made extravagant territorial claims, which included half Transcaucasia and the guardianship of the Shiite holy cities of Mesopotamia. In Aug. 1919 a new treaty was arranged between Britain and Persia. See ANGLO-PERSIAN AGREEMENT.

Language and Literature.—Persian belongs to the Iranian group of languages, closely allied to Indo-Aryan languages, and forming with latter an important section of the Indo-European family. Language and literature fall into four periods.

(1) Zend or Old Iranian.—Extends from *c.* 6th cent. B.C. to *c.* A.D. 300; is represented by *Avesta*, sacred book of modern Parsees, which is ascribed to religious lawgiver Zarathushtra (Zoroaster), who flourished between 7th and 6th centuries B.C. Language is archaic and closely related to Vedic Sanskrit. *Avesta* was collected under Sassanian kings, 3rd cent. A.D.

(2) Ancient Persian.—Represented by inscriptions of Achaemenian dynasty, consisting of about a thousand lines of texts in cuneiform writing carved upon face of great rock at Behistun. After fall of Achaemenians no literature was produced for five centuries.

(3) Pahlavi (Middle Persian).—About a hundred works have survived, chiefly religious and in Zoroastrian spirit.

(4) Modern Persian.—Begins with conversion of Persia to Islam by Arab conquest, resulting in enormous Semitic admixture in thought and language, and adoption of Arabic writing. Literature really begins with death of caliph Haroun-al-Raschid and consists chiefly of poetry. Firdausi (A.D. 940-1020), whose *Shahnamah* is Persia's great national epic, was first great poet, whose work had many imitators, and led to development of romantic, mystical, and didactic poetry. Passing over Rudagi, lyric poet, 10th cent., and Anvari (*d.* 1190), satirist, we come to Omar Khayyám (*d.* 1123), whose *Rubaiyat* or Quatrains have obtained disproportionate popularity in Europe through Fitzgerald's translation; Nizámi, epic poet 1141-1203, author of *Khusrau and Shirin*, *Iskandar Namah*, and *Laili and Majnun* (beautiful pathetic tale); Jelal-ud-din-Rumi, greatest Sufi or mystic poet, author of *Masnavi* (6 vols.); Sheikh Sa'di, great novelist and poet (*b.* Shiraz *c.* 1176), author of *Divan* or collection of lyrics, and famous *Bustan* (Garden of Perfume) and *Gulistan* (Rose Garden); Hafiz (*d.* 1389), pseudonym of Persia's greatest lyric poet, Shems-ud-din Muhammad; and Jámi (*b.* 1414), last of classic poets and Sufis. After Jami, literature declines and becomes chiefly historical. No drama appears till beginning of 19th cent., when great national passion play *Tazieh* was produced, dealing with massacre of Hussain and his family. Among modern poets best are Kaani Shirazi, Yaghma Khorasani, and Mirza Seruh Ispahání.

Architecture and Archaeology—Persia learned much from the Assyrians. The difference of material brought constructional differences, the sun-dried brick and alabaster of Assyria being unsuitable for forms which could be carried out with the stone of Persia; but the platform by which Assyrian palaces were raised above the clay soil, and consequently the steps leading up to them, and the winged bull with human head which was an Assyrian architectural ornament, were repeated in Persia.

The columnar feature is supposed to have been learned from the Medes. Of the brickwork of these empires and the Babylonian little remains, and much that has been learned of their architectural styles is deduction from buildings raised in Persia while under their rule. The columns of the palace of Cyrus and Cambyses at Pasargadae are still to be traced; the tomb of Cyrus here is also on a terrace after the Assyrian fashion.

The chief remains are at Persepolis, which Darius Hystaspes made the capital. Here are to be traced the palace of Darius, the two palaces of Xerxes, the palace of a hundred columns, and other buildings all on the same platform, to which a broad flight of steps ascends. The palaces were raised by separate platforms; they were square in plan, with many rows of columns supporting the roof, and long porticoes on three of the four sides. The largest was the palace of Xerxes, which was 350 by 300 ft. in area, and apparently the largest building of antiquity.

The Mohammedan art of Persia is famed. The tomb of Zobeide (8th cent.) at Bagdad is interesting for its stalactite vaulting. The mosque at Tabriz ascribed tothe Ilkhanians shows beautiful decoration of glazed tiles, brightly colored and adorned by characteristic Arabic interlaced ornament.

PERSIAN GULF, an inlet from the Indian Ocean, running northwards through the Strait of Ormuz between Arabia and Persia. Its area is about 75,000 sq. m., its average depth only 25 fathoms. The climate is exceedingly hot, the temperature of the water rising above 90° F. at times.

PERSIGNY, JEAN GILBERT VICTOR (1808-72), a French politician. He took part in the Napoleonic attempt on Boulogne, was taken prisoner, and sentenced to twenty years' detention. During part of this time he wrote a work on the Pyramids (*Memoire sur l'utilite des pyramides d'Egypte*), Napoleon III. rewarded his loyalty and services by conferring on him successively the titles of count and duke.

PERSIMMON, VIRGINIAN DATE PLUM (*Diospyros virginiana*), tree *c.* 60 ft. high; yields delicious plum-like fruit containing 8 to 10 seeds.

PERSIS, in ancient geography, district in S.W. of Persia now embraced in province of Fars; region mountainous, barren, and unhealthy along coast, but fertile and well watered inland. Little is known of history before time of Cyrus, who founded Pers. monarchy; Pasargadae (*q.v.*), first capital, believed to have been founded by Cyrus, whose palace and tomb were built there; later capital Persepolis (*q.v.*). After Macedonian Wars many Gk. cities were built in P.

PERSIUS, AULUS PERSIUS FLACCUS (34-62 A.D.), Rom. poet; *b.* at Volaterrae, in Etruria. P.'s poems consist of six satires.

PERSON.—(1) a subject of legal rights and duties. (2) a rational individual, capable of moral rights and duties.

PERSONAL PROPERTY, anciently distinguished from 'real' property, by the fact that in the case of *realty* the thing itself could be recovered, but in *personalty* only damages could be recovered.

PERSONALITY. See PSYCHOLOGY.

PERSONALITY, DUAL. See DOUBLE CONSCIOUSNESS.

PERSONIFICATION, a term used to designate in poetry and rhetoric, and the other fine arts, the representation of an inanimate object as a person.

PERSPECTIVE, art of representing, by a drawing on a flat surface, solid objects or surfaces, in such a way that the drawing appears to the eye in the same manner as the object itself. The eye is supposed fixed at a point called *centre of p.*, the picture being drawn in a plane (*picture plane*) perpendicular to the line of vision. If now straight lines be drawn from every point of the object to the eye, the point where each of these lines cut the picture-plane is corresponding point of the picture. The foot of the perpendicular from the eye on the picture-plane is the *centre of vision*, and all lines of the object perpendicular to the picture-plane appear to *vanish* at this point.

PERSPIRATION. See SKIN.

PERTH (31° 57′ S., 115° 52′ E.); capital, Western Australia, on Swan River; seat of R.C. and Anglican bp's; and of state univ. Pop. 1921, 115,129.

PERTH (56° 24′ N., 3° 27′ W.), county town of Perthshire, Scotland; city, royal burgh, river port, and assize town. Till James I.'s assassination, hero 1437, P. was seat of Scot. king and Parliament, owing to vicinity of Scone; scene (North Inch) of encounter between Clans Chattan and Quhele (see Scott's *Fair Maid of Perth*). Industries include dyeworks, linen, floor-cloth, and glass manufactures, ironworks, foundries, etc.; salmon fisheries. Pop. 1921, 33,208.

PERTH AMBOY, a city of New Jersey, in Middlesex co. It is on the Staten

Island Rapid Transit, the Central of New Jersey, the Pennsylvania, and the Lehigh Valley railroads, and at the mouth of Raritan river and head of Raritan bay. The city has great industrial and commercial importance. It has manufactures of cork, butter, fire brick, chemicals, oil, hollow brick and emery. There are several private and public institutions, and a public library. The city was settled about 1780 by a colony from Scotland and received a city charter in 1718. Pop. 1920, 41,707.

PERTHSHIRE (56° 30′ N., 3° 45′ W.), large inland county in centre of Scotland; bounded by Inverness, Aberdeen, Forfar, Fife, Kinross, Clackmannan, Stirling, Dumbarton, and Argyll; area, *c.* 2,500 sq. miles. County is almost completely mountainous, with many beautiful lochs, rivers, forests, and passes; chief mts. are Grampians, Sidlaws, and Ochils, and among highest summits are Ben Lawers (*c.* 4,000 ft.), Ben More (3,843 ft.); Ben Lui (3,708 ft.), and Schiehallion (3,547 ft.); river Tay, with tributaries (Garry, Tummel, Earn, and others), drains almost whole county; S. watered by Forth and Taith; largest lochs are Lochs Tay, Earn, Rannoch, Katrine, Vennacher, and Achray; chief towns, Perth, Crieff, Blairgowrie, and Dunblane. Chief industries are dyeing, bleaching, tanning, brewing, distilling, quarrying, and manufacture of woolens, cotton, and linen. Pop. 1921, 125,515.

PERTINAX, HELVIUS, Roman emperor from Jan. 1 to March 28, 193 A.D., was reluctantly persuaded to accept the purple on the death of Commodus. But having attempted to check the license of the praetorian troops, he was slain by the latter, who then put up the empire to sale.

PERU, republic, S. America (1° 32′-19° 13′ S., 69°-81° 30′ W.); bounded N. by Ecuador, E. by Brazil and Bolivia, S. by Chile, S.W. and W. by Pacific; area, 695,733 sq. m.; coast-line, *c.* 1,400 m. Surface has a narrow coastal strip rising rapidly to the Andes, which here form three or more parallel chains with a width of *c.* 250 m., running in same direction as coast and having great fertile valleys and tablelands spread out among them. Mountains reach height of 21,000 to 22,000 ft., the highest peaks being Huascan (*c.* 22,050 ft.) and Huandoy (*c.* 21,090 ft.), while there are many volcanic peaks over 19,000 ft. in height. The plateaus attain a height of from 12,000 to 13,000 ft. above sea-level. To the E. of Cordilleran ranges is region of forest and pampas sloping to Amazon basin. Drainage of this region, as well as of the northern and central tableland, is carried off by head-waters of Amazon (Maranon) and of its great tributaries, Huallaga, Ucayale, and Javari, and by the upper streams of the Jurua, Purus, and Madeira farther S. The rivers of the coastal strip are unimportant. In extreme S.E. is Lake Titicaca, the largest lake in S. America, at a height of 12,600 ft. above the sea. The largest towns are the capital, Lima 176,400 and Callao 52,847. Climate varies with elevation; temperature on coast, 60° to 80° F.; on tablelands, 40° to 60° F.; in W. districts, 64° to 86° F. No rain falls on a coastal strip, where there is, however, much cloud. See map of S. America.

History.—In very early times a considerable degree of civilization was attained by various peoples in Peru. About the 12th cent. the Incas established themselves in the country, and, making Cuzco their seat of government, gradually increased their dominions until the whole region from Ecuador to Chile was under their sway. Their rule continued for over three centuries, during which they developed a fairly successful system of socialism and carried out magnificent building and engineering works. The Span. conquest of Peru was carried out by Francisco Pizarro, between 1531 and 1541 when he was murdered by the followers of Almagro, the Inca prince. Peru became a Span. viceroyalty 1542, and so remained until rebellion of the Span. colonies against mother country early in 19th cent.

Peru was the last of the colonies to attain independence. It became a republic only in 1824, after defeat of Spaniards at Ayacucho; ruled by the liberator, Bolivar, until 1826. During next two decades various revolutions occurred and several new constitutions were drawn up, but under Ramon Castillo, president in 1845-51 and 1855-62, the prosperity of the country increased. A boundary dispute with Brazil was settled in 1876; and in 1879 occurred the war with Chile, which ended in 1883 with the Treaty of Ancon, whereby Chile obtained Tarapaca and the right to hold Arica and Tacna for ten years, after which a popular vote was to decide to which state these two provinces should belong. This question, however, still remains open, and the coastal territory between 17° 47′ S. and 19° 13′ S. is still occupied by Chile. The dispute was referred to the United States for arbitration in 1923. Another revolution took place in 1894-5. Boundary disputes have also occurred with Bolivia, Colombia, and Ecuador. That with Bolivia was settled by negotiations between the states concerned; that with Colombia

and Ecuador was referred to Alfonso of Spain, who in 1910 refused to act further in the matter, which was then referred to the mediation of U. S., Argentina, and Brazil. Boundary disputes with Brazil were settled in 1910. Peru severed relations with Germany Oct. 1917.

Government is republican; executive power vested in president (elected for four years by popular vote), two vice-presidents (similarly elected), and cabinet of six ministers. Legislature consists of Congress of two houses—Senate (52 members) and House of Representatives (116 members), both senators and representatives being elected by popular vote. Peru is divided for administrative purposes into 18 departments and two provinces. Primary education is gratuitous and nominally compulsory. The state religion is Roman Catholicism; other religions are tolerated in practice, although prohibited by the terms of the Constitution of 1860. The army numbers about 5,000 in all, and military service is obligatory. The majority of the population are Indian; whites, chiefly pSanish, form about one seventh and half-breeds about one-fourth, while there are smaller proportions of negroes and Chinese. Pop. *c.* 3,000,000.

Resources.—Mineral resources are enormous, but the difficulty of transport has arrested development. Silver occurs in vast quantities, and gold, copper, lead, quicksilver, antimony, iron, sulphur, and other minerals are produced. The forests of the eastern slopes produce valuable timber, in addition to cinchona, coca, cacao, rubber, sarsaparilla, and vegetable ivory. Bananas, vines, olives, cotton, tobacco, coffee, sugar-cane, and cacao are cultivated, and various cereals are grown. Llamas and cattle are raised. Sugar is the principal crop; annual export, about 150,000 tons. Exports include minerals, cotton, wool, gums, etc.; imports, textiles, machinery, provisions and general goods. Railway mileage 1,724.

PERU, a city of Illinois, in La Salle co. It is on the Chicago, Rock Island and Pacific, the Chicago, Burlington and Quincy, and the Chicago, Ottawa and Peoria railroads, and on the Illinois river. Its industries include grain elevators, rolling mills, zinc works, flour mills, etc. It has a hospital and a public library. Pop. 1920, 8,869.

PERU, a city of Indiana, in Miami co., of which it is the county seat. It is on the Lake Erie and Western, the Wabash, and the Chesapeake and Ohio railroads, and the Wabash river. Its industries include railroad shops, flax works, carriage factories, foundries, glass works, furniture factories, flour mills, etc. It has a public library and a hospital. Pop. 1920, 12,410.

PERUGIA (43° 7′ N., 12° 23′ E.), city, on Tiber, Italy (Umbria); capital of province P.; with cathedral (XV. cent.), S. Pietro (XI. cent.), and other interesting churches; taken by Romans, 310 B.C.; passed to popes, IX. cent.; united to Piedmont, 1860; centre of Umbrian school of painting, XV. cent.; woolens, silks, liqueurs. Pop. *c.* 66,000. For Perugia province, see UMBRIA.

PERUGINO, PIETRO (1446-1524), eminent Ital. painter; studied at Florence; went to Rome about 1483, and in the Sistine Chapel executed the still extant fresco of *Christ giving the Keys to Peter.* From 1486-99 he was again in Florence, where he gave lessons to Raphael. He was at Perugia from 1449 to 1504, helping to adorn the Hall of the Cambio; in Rome again from 1507-12, where he assisted in decorating the stanze of the Vatican.

PERUVIAN BARK, dried bark of Cinchona. See also QUININE.

PESARO (43° 55′ N., 12° 53′ E.), town, E. coast, Italy; walled and fortified; episcopal see, has two cathedrals and several palaces. Pop. 28,000.

PESCADORES (24° N., 119° 40′ E.), group of small Jap. islands in Strait of Formosa, China Sea. Pop. 50,000.

PESCARA (42° 20′ N., 14° E.), river, Italy; flows into Adriatic; ancient *Aternus.*

PESCARA, FERNANDO FRANCESCO D'AVALOS, MARQUIS OF (1489-1525), Ital. condottiere in service of Spain; fought with distinction at *Pavia,* and settled in Milan; conspired with Morone for crown of Naples, but plot was abortive.

PESCHIERA SUL GARDA (45° 26′ N., 10° 42′ E.), fortified town, Verona, Italy, at foot of Lake Garda.

PESCIA (43° 53′ N., 10° 42′ E.), town, Firenze, Italy; silk, olives. Pop. (commune) *c.* 18,000.

PESCIA (43° 53′ N., 10° 42′ E.), city, Lucca, Italy; cathedral, silk. Pop. 18,500.

PESHAWAR.—(1) (*c.* 34° 2′ N., 71° 45′ E.), district, North-West Frontier Province, India; area; *c.* 2,560 sq. miles. Pop. 790,000. (2) (33° 59′ N., 71° 30′ E.), capital of above; important military station; centre of trade with Afghanistan and Bokhara. Pop. 100,000.

PESHIN, PISHIN (30° 27′ N., 67° E.), district, Brit. Baluchistan.

PESSIMISM, view that what is, is bad; opposed to *optimism*, the view that what is, is good (or as good as possible). Schopenhauer is the most distinguished modern pessimist; the ultimately real is blind, irrational will, which cannot be satisfied, and therefore, when it becomes conscious, as in man, leads to far more pain than pleasure.

PESSINUS, ruined town near Bala Hissar, Asia Minor; founded by Phrygians, subsequently belonged to Gauls; was centre of cult of Cybele.

PESTALOZZI, JOHANN HEINRICH (1746-1827), Swiss educationist; dwelt with waifs at his farm, Neuhof, but failed owing to lack of business ability; kept school at Yverdon, 1805-25; wrote novels on educational themes; taught by intuitional method, making psychology his foundation and combining manual with mental exercises.

PÉTAIN, HENRI PHILIPPE (1856), Fr. soldier; *b.* at Cauchy-á-la-Tour, Pas-de-Calais. He belongs to the infantry, and became colonel in 1910. His skillful command of his troops in the Charleroi retreat (Aug. 1914) led to his promotion to rank of Brigadier-general. In Artois he showed himself one of the most successful exponents of trench warfare tactics, and was largely responsible for the successes of that campaign. He succeeded Castelnau in command of 2nd Army, and in Champagne offensive 1915 again distinguished himself; and when Castelnau became chief of the General Staff, replaced him as commander of the central group of armies. In 1916 he was given command at Verdun, and his defence of that place is one of the epics of the war. In 1917 he succeeded Nivelle as commander-in-chief of the Fr. Armies of the North and North-East. his thorough knowledge of the Fr. soldier enabling him to restore the *moral* of the army after the crisis which followed the great Ger. offensive of April. He was made a Marshal of France on the day he led the Fr. troops into Metz Nov. 1918.

PETALUMA, a city of California, in Sonoma co. It is on the Northwestern Pacific, and the Petaluma and Santa Rosa railroads, and on Petaluma river. It is the center of an extensive agricultural and poultry raising region. It has silk mills, flour mills, machine shops, shoe factories, etc. Pop. 1920, 6,226.

PETCHORA, or **PECHORA,** a river of Russia, rising in the Ural Mts., and after a northerly course, turns S.E., and then N. again, finally entering the Arctic Ocean. Its length is about 990 miles. Area of basin, 130,000 sq. miles.

PETER I. (PETER KARAGEORGEVITCH) (1846-1921), a king of Serbia; *b.* in Belgrade, Serbia. He was the *g.s.* of 'Black George', a swineherd, who won his throne through a strong personality, and he was the *s.* of Prince Alexander, who was deposed in 1858. During his youth and middle age he was an exile, the rival house being in supremacy in Belgrade. He was educated in the St. Cyr military academy, in France. During the Franco-Prussian War of 1870 he served in the French Army, at first as a lieutenant, later as captain, being wounded and awarded a medal for bravery. During the Russo-Turking War of 1877-78 he fought in the Russian Army, thus contributing toward the complete liberation of his country from the Turks. After 1890 he took up his residence in Geneva, Switzerland. In 1903 Alexander I. of Serbia and his former mistress, Queen Draga, were assassinated by a group of conspirators in the Serbian Army, the same group proclaiming Peter King. Although there was not a vestige of evidence to indicate that he was implicated in the plot, for many years after his ascent to the Serbian throne Peter I. was ostrocized by the Great Powers, largely at the instigation of Austria, whose statesmen were enraged at the assassination of Alexander, who had been a puppet in the hands of the Austrians, one of the causes of his assassination. The policy of Peter I. was, therefore, strongly anti-Austrian, a fact which in turn decided the Austro-Hungarian Empire to follow the policy which eventually resulted in the World War. During this latter event, after Serbia had been overrun by the Austro-German forces, King Peter lived in exile on the Island of Corfu, in Egypt and in Tunis, until the final collapse of the Teutonic Allies in the Balkans enabled him to return to Belgrade, on November 3, 1918.

PETER I. (*d.* 1104), king of Aragon and Navarre; famous slaughterer of Moors.—Peter II. 1174-1213, king of Aragon; cruel, handsome, amorous, and a troubadour.—Peter III., the Great, 1236-85, king of Aragon; profited by *Sicilian Vespers* (q.v.), 1282, to seize Sicilian throne.—Peter IV., the Ceremonious, 1319-87, king of Aragon; long reign occupied in civil and foreign wars.—Peter the Cruel, Pedro I. 1334-69, king of Castile; pitiless and extortionate, but gave order to realm.

PETER I. THE GREAT (1672-1725),, emperor of Russia; succ., 1682, sole ruler on death of bro. Ivan, 1696; illiterate himself, but introduced western civilisation into Russia. To win a port on Black Sea P. attacked Turkey and cap-

tured Azof, 1696; revolt of Strelitz faction ruthlessly crushed, 1698; defeated at *Narva*, 1700, in attempt to partition Sweden with Poland and Denmark, but captured part of Ingria and founded new capital, Petersburg, there, 1703; defeated Sweden at *Poltava* and seized Baltic provinces and part of Finland, 1709, thus acquiring wide seaboard; coalition of Sweden and Turkey compelled restitution of Azof, 1711; m. his mistress (afterwards famous Catherine I.), 1712; Finland wholly conquered, 1713; but restored to Sweden, 1721, for quitclaim of Baltic provinces, etc.; Caspian provinces wrested from Persia, 1722.

PETER III. (1728-62), emperor of Russia; *s.* of eldest *d.* of Peter the Great by Duke of Holstein-Gottorp; overthrown by wife, Catherine II.; assassinated.

PETER, FIRST AND SECOND EPISTLES OF. These two epistles must be considered quite separately: 1 Peter seems to have been written especially to Gentile Christians, but there is no sign of the early dispute about the observance of the law. Though purporting to be the work of St. Peter, its tone is distinctly Pauline, and this, with certain other difficulties, has led to its being regarded as spurious by several important modern critics. During the early ages, however, it was received without question, and even now it is less difficult to accept the epistle as the genuine work of St. Peter than to accept any of the various theories propounded by its adversaries. With 2 Peter, the case is different. No certain trace of this epistle is found in the Christian literature of the 2nd century, and it is improbable that any lost books contained any. During the 3rd century, the epistle was received by certain churches, but we find mention of the doubtfulness of its authenticity in such writers as Origen, Eusebius, and Jerome. The history, therefore, of its reception into the canon is obscure. Internal evidence, therefore, is alone left to establish its genuineness, and this can hardly be done, the difficulty being accentuated when the tone of the second epistle is compared with that of the first. It is probably a work of the 2nd century, a production of the school that also produced the *Apocalypse of Peter*.

PETER LOMBARD (*c.* 1100-60,) mediaeval scholar; first doctor of theology of Paris univ.; wrote great manual of scholastic system, *Sententiarum Libri IV.*, commentaries upon which were written by Albertus Magnus and Thomas Aquinas.

PETER, ST., the 'chief of the Apostles,' often called Simon Peter, Simon being the Greek for the Semitic Simeon, and Peter (Gk. *petros*, rock) corresponding to Aramaic *kepha* (rock). P. is prominent in the Gospel story; he is one of the small group of apostles in closest personal association with the work of Christ. His confession at Caesarea Philippi can almost be called the tuning-pont of the Gospel story. (The term 'Son of God' has probably here only a Messianic significance.) His denial of Christ at the Passion is also extremely important—particularly interesting in such a detail as his Aramaic accent's being noticed.

After the earthly life of Christ P. becomes leader of the Apostles in Jerusalem. Much controversy has raged round the exact relation of Peter and Paul as regards the admission of the Gentiles to Christianity. The date of his death is uncertain; according to early tradition he was the founder of the Roman Church and was martyred there, though probably not at the same time as St. Paul.

PETER THE HERMIT, priest associated with First Crusade, which he preached and helped to lead in 1096; his army was destroyed by Turks; date of death uncertain; tradition has exaggerated importance of his work.

PETERBOROUGH (44° 17′ N., 78° 24′ W.), town, port of entry, on Otonabec, Ontario, Canada; machinery. Pop. 15,300.

PETERBOROUGH (52° 35′ N., 0° 16′ W.), city, municpal and parliamentary borough, Northamptonshire, England, on river Nene. P. contains various educational establishments; important railway center; manufactures agricultural implements. Pop. 1921, 35,533.

Soke of **P.**, administrative county, containing **P.**; area, 83½ sq. miles. Pop. 45,000.

PETERBOROUGH AND MONMOUTH, CHARLES MORDAUNT, EARL OF (*c.* 1658-1735), Eng. statesman; succ. uncle as Earl of P., 1697; gov. of Jamaica, 1702; general of allied armies in Spain, 1705, and expelled Fr. force.

PETERHEAD (57° 30′ N., 1° 46′ W.), port, Aberdeenshire, Scotland; centre of herring and other fisheries; large granite quarries and polishing works; convict station, Pop. 13,003.

PETERHOF (50° 50′ N., 29° 53′ E.), town, St. Petersburg government, Russia, on Gulf of Finland; gem-cutting industry; contains Great Palace of Peter the Great. Pop. 12,000.

PETERMANN, AUGUST HEINRICH (1822-78), a German geographer, assisted Berghaus at Potsdam, 1839-45. He assisted Milner with his *Atlas of Physical Geography* and with him produced *Account of the Expedition to Central Africa*, 1845. P. gave special study to the geography of Africa and of the Arctic zone. In 1854 he directed Perthes' geographical institute at Gotha, and started the monthly *Mitteilungen*, 1855.

PETERS, HUGH (1598-1660), Eng. Puritan; preached in England, then in Holland and America; returned to England and attacked Laud; served with Parliamentarians in Civil War; at Restoration arrested and executed.

PETERS, JOHN PUNNETT (1852-1921), an American archaeologist, and Hebrew scholar, *b.* in New York City. He graduated from Yale University, in 1873, continued his studies abroad and in 1885 became professor of Hebrew at the University of Pennsylvania. Having been ordained a priest of the Episcopal Church, in 1877, he succeeded his *f.* as rector of St. Michael's Church, in New York City, in 1893, remaining there till 1919, when he became professor of New Testament literature and language in the University of the South. During 1888-95 he was at the head of a number of archaeological expeditions in Babylonia for the University of Pennsylvania, when he discovered the site of the ancient city of Nippur and began excavation.

PETERS, KARL (1856), Ger. explorer; founded the Ger. Colonization Soc. 1884; director Ger. E. Africa Co. 1885, but dismissed on charges of cruelty to natives, 1896; led expedition for relief of Emin Pasha 1888-90; commissioner for settling Anglo-Ger. frontier in E. Africa, 1892; explored country of the Zambezi 1899 and 1905; pub. *The El Dorado of the Ancients*, 1902, etc.

PETERSBURG, a city of Virginia, in Dinwiddie co. It is on the Atlantic Coast Line, the Norfolk and Western and the Seaboard Air Line railroads, and on the Appomatox river. It is the chief trading center for a large cotton and tobacco raising region and has also large agricultural implement factories. Its industries include tobacco factories, cotton factories, flour mills, silk mills, etc. It is the seat of the Central State Hospital for the Insane, and other State institutions. It has libraries and parks. Some of the most important actions of the Civil War took place in the neighborhood of Petersburg. The so-called seige of the city lasted from June 16, 1864, to April 2, 1865, and during that time 13 pitched battles were fought. Intrenchments of the Federal and Confederate armies still form conspicuous features of the landscape. Pop. 1920, 31,002.

PETER'S PENCE, tax formerly levied on R.C. families; institution attributed to Ina of Wessex 688-725, or Offa of Mercia, 757-96; new voluntary contribution to maintenance of papal state.

PETER'S, ST. See ROME.

PÉTION DE VILLENEUVE, JÉRÔME (1756-94), Fr. politician; one of Girondins; pres. of Convention; wrote on legal and other subjects.

PETITIO PRINCIPII, begging the question; in logic, the fallacy of assuming the proposition to be proved.

PETITION OF RIGHT, THE, granted (but not acted upon), June, 1628, by Charles I., to whom Parliament refused supplies until he conceded its demands for suppression of illegal taxation and imprisonment and billeting of soldiers on private persons.

PETOSKEY, a city of Michigan, in Emmet co. It is on Little Traverse Bay. Its industries include the manufacture of lime, lumber, flour and paper. Water power is furnished by Bear river. Pop. 1920, 5,064.

PETRA, ruined city in N. Arabia, lying in valley near Mound Hor and surrounded by cliffs and ravines; once important caravan center and capital of Nabataeans; many ruined buildings to be found; most remarkable remains are treasury, temples, tombs, and dwellings hewn out of cliffs and rocks enclosing city; architecture of Gk., Rom., and Oriental types. P. remained independent till *c.* 106 A.D., when taken by Romans; declined with rise of Palmyra.

PETRARCH, FRANCESCO PETRARCA (1304-74), Ital. poet; one of the greatest lyric poets of all time. His life was a somewhat stormy one, due to the varied vicissitudes of Ital. political life. Destined for the law, he studied at Montpellier and Bologna, but devoted himself to classical and especially Rom. letters. Although an ecclesiastic he never took orders, and refused a secretaryship to the Pope. He travelled extensively and made valuable discoveries of manuscripts. In 1341 he was crowned poet laureate at Rome.

His chief works are the epic poem *Africa*, centering round the character of Scipio, the prose hist. biographies known as *De Viris Illustribus*, the prose dialogues *De Contemptu Mundi* and *Secretum*,

a couple of theological treatises, and the famous collection of letters in groups called *Varioe, Seniles, Familiares, Ad Veteres Illustres*, and *Sine Titulo*. But his fame as a lyric poet rests on the *Canzoniere*, sonnets to the mysterious Laura (whom he met at Avignon, and whose death he laments in his *In Morte di Madonna Laura*), the lyrical story of one of the great loves of the world's lit.

PETREL FAMILY, *Procellariidoe*, a family or marine swimming birds found in all the great oceans. They are strong swimmers and include the Storm P., a British breeding bird.

PETRIFICATION. See Fossils.

PETRIOU (13° 40′ N., 101° 10′ E.), town, port, Pachim division, Siam. Pop. *c.* 10,000.

PETROGRAD (formerly St. Petersburg), cap. of Russia until 1920 (59° 57′ N., 30° 20′ E.), at mouth of river Neva where it enters the Gulf of Finland, 400 m. N.W. of Moscow. Neva and canals are frozen from the end of Nov. to about the end of April. Chief permanent bridges Nicholas Alexander and Trinity, both over Neva. Central and wealthier portions are those of a city of magnificent distances; wide, straight, very long streets, and large open spaces. Central point of street system the old Admiralty Buildings, where the Nevsky (3 m.) and Voznesensky Prospekts and Gorokhovaya Ulitsa meet. Before the establishment of the Soviet Republic in 1919, Petrograd was one of the most beautiful cities in Europe. Under the Soviet rule the city fell into decay, and many of its most notable buildings were destroyed. Winter Palace, an immense quadrilateral 1732-62, burnt 1837, rebuilt 1837-8, contains magnificent rooms of state. Other palaces: Old and New Mikhailovsky residences, Taurida (seat of Duma), Anitchkov, Marble or Orlov, and palaces of Dukes Vladimir and Michael. Most valuable art collections in Winter Palace and Hermitage 1765; rebuilt and greatly enlarged, 1840-52. Imperial or National Library ranked after those of Paris and London; contained Codex Sinaiticus and other priceless MSS. Library of Academy of Sciences had 500,000 vols.; univ. (founded 1819) had also large library. Many learned societies and technical schools. Observatory at Pulkowa, 9 m. S., completed 1839. Besides buildings already mentioned, architectural features included house of the Senate and Holh Synod, monument to Peter the Great 1775-82, and numerous other statues; thirteen cathedral churches, chief being St. Isaac, Kazan, st. Alexander Nevsky, St. Peter and St. Paul, the Resurrection, and the Emperor Alexander II. St. Isaac is most sumptuous; its gilded dome is central point of all city views. The Peter-Paul cathedral contains tombs of the Russian emperors. Other churches are too numerous to mention. The Gostinnyi Dvor, or Grand Bazaar, lies between the Nevsky Prospekt and the Sadovaya, forming a quarter of its own. There are also People's Theatres (first established in 1784), important hospitals, the Foundling Institute, 1778, and the fortress-prison of St. Peter and St. Paul 1703.

The industrial establishments included metal works, iron foundries, sugar refineries, distilleries, breweries, shipbuilding yards, printing works; tobacco, soap, crystal and glass, cotton and cloth, leather, cordage, pottery, porcelain, and machinery are also made. Kronstadt-Petrograd Canal, 1877-85, enables seagoing ships to come up to the Nicholas Bridge. Up to the revolution, 1917, there were busy state dockyards. City is also connected by river, canal, and lake with the Volga and the Dnieper, and so with the Caspian and the Black Sea. Six railways enter the city.

Founded, 1703 by Peter the Great on drained marshes; was created imperial cap. 1712; destructive fires, 1736-8, after which city reconstructed with Winter Palace as centre; relics of St. Alexander Nevsky brought to the city in 1724; and was center of Russian political crisis in 1905, after which much civic improvement. Shortly after the outbreak of the World War the Germanized name St. Petersburg was changed to Petrograd. See Russia (*History*). Pop. said to have fallen from 1,900,000 to *c.* 700,000.

PETROLEA (42° 52′ N., 82° 6′ W.), town, Ontario, Canada, on Bear Creek; petroleum wells. Pop. 4,600.

PETROLEUM, coal oil, an inflammable, oily liquid, varying in appearance from a light straw, transparent yellow, to a pitchy blackness. There is still much uncertainty in regard to its geological origin. According to the most widely accepted theory, it is the outcome of the natural distillation of great masses of buried vegetable matter. It is found in many countries, all over the world, but chiefly, from a commercial point of view, in Southern Russia, Turkey, Rumania, Mexico and, above all, in the United States. Up to within recent years the bulk of the world's supply came from this country. It was known to exist in Northern Pennsylvania over eighty years ago, and was generally called Seneca oil, but no practical effort was made to obtain it in commercial

mined by its external configuration. Later it was realized that drugs possessing certain characteristics were applicable to certain classes of ailment (*e.g.*, astringents for diarrhoea), and the search for active principles began. During the present century pharmacology has made great strides, the action of drugs being much more thoroughly understood in the light of various discoveries in chemistry and physiology.

Action of Drugs.—Drugs act on the organism in various ways. The action of some is purely physical—*e.g.*, the insoluble salts of bismuth relieve gastric irritation by forming a protective lining to the stomach. Hypnotics act physically in another way: as a rule these are insoluble in water, but soluble in fats and oils; as the brain cells contain fatty (lipoid) substance, these drugs have a tendency to accumulate in the brain. Saline aperients act physically by *osmosis*—that is, by attracting water into the intestine. Other drugs act *chemically*—*e.g.*, tannin acts as an astringent by combining with the albumin of the tissues.

Most drugs, however, act directly on the protoplasm of the body-cells. Cocaine, strychnine, etc., have what is known as a *specific* action on certain nerve cells, producing the results associated with these drugs. Other drugs act injuriously on the protoplasm of disease-producing bacteria, while harmless to the body cells; a good example of this is 'salvarsan' or '606', a compound of arsenic used against syphilis. All antiseptics have a destructive action on bacteria, but as a rule they are also destructive to the body cells, and cannot be given internally, while externally they have to be used with caution.

The action of a drug may be either *direct* or *indirect*—*i.e.*, it may exercise a direct action on a certain organ of the body, as digitalis acts on the heart; or it may cause certain alterations in the bodily functions, and thus bring about an indirect action on other organs; for example, digitalis, by stimulating the heart, improves the circulation in the kidneys, and causes indirectly a larger secretion of urine.

Recent research in pharmacology shows that many factors must be taken into account in determining the action of drugs. *Chemical constitution* is an important factor, but this depends as much on the arrangement or 'orientation' of the molecule as on the actual composition of the drug. For example, salicylic acid has certain effects on rheumatism; but the introduction of an acetyl group, forming acetyl-salicylic acid, gives us 'aspirin', a drug whose properties in this respect are not only greatly intensified, but have a character of their own. *Rate of absorption* is another factor. Drugs administered in a form which ensures slow absorption have a different action from the same drug when rapidly absorbed. *Colloidal condition* often affects the action of a drug. See CHEMISTRY. The employment of active principles in place of the crude drug (*e.g.*, morphine for opium, strychnine for nux vomica) has been found wanting in many respects, the crude drug often possessing other constituents which are in themselves of value. A good example of this principle is seen in tea and coffee, which could never be replaced by caffeine.

PHARMACOPŒIA, term applied to a book pub. by an authorized body, containing a list of drugs, with their sources, physical and chemical properties, and tests for their purity; also preparations made from these drugs. The earliest Pharmacopoeia pub. in England was that of London, issued by the College of Physicians in 1618; the *Edinburgh Pharmacopoeia* was first pub. in 1699; the *Dublin Pharmacopoeia* in 1807. These three works were combined and unified in the first edition of the *British Pharmacopoeia*, pub. in London in 1864. Most countries have now national pharmacopoeias pub. by the respective governments, the *Pharmacopoeia* of the U. S., however, being issued under authority of a commission of medical and pharmaceutical societies.

PHARMACY (Gk. *pharmakon*, drug), the art of preparing drugs and of compounding and dispensing physicians' prescriptions. The word is also applied to the premises in which such work is done, and the person qualified to practise pharmacy is entitled by law to call himself a *pharmacist*. Early in the 17th cent. the *apothecaries*, who were the compounders of medicines, as contrasted with the *druggists* who merely sold drugs, obtained a charter, and by the end of that century had begun to prescribe and to take upon themselves the duties of physicians.

PHARNABAZUS (fl. V.-IV. cent. B.C.), Persian satrap of Phrygia under Darius II.; entrusted with reduction of Gk. cities of Asia Minor; received and assassinated Alcibiades; defeated Spartans off Cnidus, 394.

PHARNACES I. (*c.* 190-156 B.C.), King of Pontus, the *s.* of Mithridates IV. He waged war upon Eumenes, King of Pergamus, and Ariarathes, 181-179, in which the Romans intervened.

PHARNACES II. (*d.* 47 B.C.), King of Pontus, the *s.* of Mithridates the

Great, whom he succeeded in 63 B.C. He encountered the Roman forces, under Julius Caesar, near Zela, 47, and was slain in the battle.

PHAROS, a peninsula, formerly an island, off the N. coast of Egypt. On founding Alexandria, Alexander joined it to the mainland by a mole. Ptolemy II. erected a lofty tower on this island, and by the light of torches or fires shown from the upper windows, ships were guided safely into harbor. This famous lighthouse is the earliest known.

PHARSALUS (39° 17′ N., 22° 27′ E.), town, Thessaly, Greece; scene of battle of *Pharsalia*, where Caesar defeated Pompey, 48 B.C.

PHARYNGITIS, inflammation, frequently chronic, of the mucous membrane of the pharnyx, or upper part of the throat, and of the soft palate, usually due to unhygienic surroundings, exposure to cold and damp, a debilitated condition, anaemia, or digestive disorders, or associated with a tendency to gout or rheumatism.

PHARYNGOBRANCHII. See FISHES.

PHARYNX, that part of the alimentary canal that lies between the mouth and nasal passages above and the oesophagus or gullet below, the larynx, which leads to the trachea and lungs, going off from its anterior aspect. It is formed by the three overlapping constrictor muscles of the pharynx behind and at the sides, while in front the soft palate dips downwards and backwards, dividing the nasal p. from the oral p. Above the soft palate, in the posterior part, the Eustachian tubes, communicating with the ear, open, one on each side, and below their openings is a mass of lymphoid tissue, termed the pharyngeal tonsil.

PHASIS, RIVER, in ancient Colchis, now known as Rion.

PHEASANT FAMILY (Phasianidae), large and important family of game birds, widely distributed throughout the Old World, the majority being of Oriental origin. They are birds of splendid coloring, especially the males, and are characterized by long and wedge-shaped tail, spurred legs, and absence of feathers on sides of head; they often bear combs or wattles. Amongst them are the true pheasant (*Phasianus*), a familiar (introduced) sporting bird, while other handsome genera are the golden pheasant (*Chrysolophus pictus*), the Argus pheasant (*Argusianus argus*), and the horned pheasants or tragopans of N. India and China. The partridges (*Perdrix*), with mottled protective coloring and alternate beating and gliding flight, range over a wide area in Europe and Asia. The quail (*Coturnix*), though less in size, resembles the common partridge, but has a peculiarly distinctive note. It is a visitor, but ranges throughout Europe, N. Asia, and India, and winters in Africa. Most wonderful of all are the showy peacocks (*Pavo*), of which three species are known, all of which hail originally from the Far East.

PHEIDIAS (*b. c.* 500 B.C.), the greatest sculptor of ancient Greece; *b.* at Athens. He executed a number of splendid statues for Athens, including an ivory and gold figure of the goddess Athena. A colossal figure of Zeus at Olympia was considered his masterpiece. Fragments of his work are among the Elgin Marbles in the British Museum.

PHEIDON (*c.* VII. cent. B.C.), king of Argos; sought supremacy in Peloponnesus; said to have laid plot to murder flower of Corinthian youth; resisted by Sparta.

PHELAN, JAMES DUVAL (1861), a U. S. Senator, *b*, in San Francisco, Cal. He graduated from the St. Ignatius University, in 1881, studied law at the University of California, began to practice, became interested in politics and was elected Mayor of San Francisco for three terms, covering the period 1897-1902. From 1915 to 1921 he was U. S. Senator from California.

PHELPS, AUSTIN (1820-90), an American educator, *b.* in West Brookfield, Mass. He graduated from the University of Pennsylvania, in 1837, studied at the Yale University Theological School and was for a time pastor of the Pine Street Congregational Church, in Boston. In 1848 he became professor of homiletics and sacred rhetoric at Andover Theological Seminary, being president of that institution for ten years after 1879. He wrote *The Still Hour*, 1859; *Men and Books*, 1882 and *My Studies and Other Essays*, 1886.

PHELPS, EDWARD JOHN (1822-1900), an American educator and diplomat, *b.* in Middlebury, Vt. He studied law at the Yale University Law School and began to practice in his native town, becoming prominently interested in politics. President Fillmore appointed him Controller of the U. S. Treasury, in 1851. For a time he was Kent professor of law at Yale University Law School. During 1885-9 he was U.S. Minister to England. He wrote *The Life and Character of Linsley.*

PHELPS, ELIZABETH STUART. See WARD, ELIZABETH STUART PHELPS.

PHELPS, WILLIAM LYON (1865), an American university professor and writer, *b.* in New Haven, Conn. He graduated from Yale University, in 1887, was instructor and assistant professor of English there, and since 1901 has been Lampson professor. Among his writings are *The Beginning sof the English Romantic Movement*, 1893; *The Pure Gold of Nineteenth Century Literature*, 1907; *The Advance of the English Novel*, 1916; *The Twentieth Century Theatre*, 1918; *Essays on Modern Dramatists*, 1920 and *Human Nature in the Bible*, 1922.

PHENACETIN, drug prepared by the action of glacial acetic acid upon paraphenetidin, a coal-tar derivative, consisting of colorless, tasteless, scaly crystals; used as an antipyretic for reducing the temperature in certain conditions, and as an analgesic for relieving the pain of neuralgia, sciatica, migraine, or headache.

PHENOL. See CARBOLIC ACID.

PHENOMENON that which appears as distinguished from that which exists. The term used to denote the world of sense as opposed to the world of reason.

PHI BETA KAPPA, See COLLEGE FRATERNITIES.

PHIDIAS. See PHEIDIAS.

PHIGALIA, ancient Gk. city in S.W. Arcadia, situated on rocky site amongst Peloponnesian Mts.; captured by Lacedaemonians, *c.* 660 B.C.; later regained independence, but fell into decay under Rom. rule; considerable part of city wall and a large square fortress still traceable; also temple, famous for its beauty and dedicated to Apollo Epicurius, some 5 or 6 miles distant.

PHILADELPHIA (the city of brotherly love) is the largest city of Pennsylvania and the third in population in the U. S. It lies 130 m. N. of Washington, D. C., and is situated on the Delaware R. at the juncture with its great tributary the Schuylkill and about 50 m. from its mouth. P. was founded by William Penn the Quaker; it is sometimes called the Quaker City. German Town and Chestnut Hill are two large and attractive suburbs. In Christchurch Cemetery is the grave of Benjamin Franklin. Independence Hall building was completed in 1735, and here the constitution of the U.S.A. was framed. P. was the capital of the Federal States from 1787 until 1800, and the capital of Pennsylvania from 1683 until 1800. The U.S.A. mint was founded here in 1792. In colonial days P. was a great political centre, and here assembled the history-making Continental Congress of 1774. On July 4, 1776, the Declaration of Independence was declared here, and Articles of Federation were signed on July 9, 1778. The public library has over fifteen branches in the city and more than 260,000 volumes. Benjamin Franklin founded this library in 1731. There are many parks; Fairmount Park, the best known and largest, is nearly 2,000 acres in extent. P. is the seat of the University of Pennsylvania. It is celebrated for the efficiency of its elementary schools and for its normal and manual training schools, among which may be numbered the Drexel Institute and Girard College. Output of manufactured goods is only excelled by New York and Chicago, and the city is first in the state in leather trade and second in manufacture of cigars and clothing. There are large printing and publishing houses. There is a great domestic trade in grain, live-stock, fruit, lumber, etc., and a large European trade, especially with England. The Baldwin Locomotive Works are the largest in America. This town is noted, like Boston, for social exclusiveness. The Quaker influence is now nil. Though equally busy it is a quieter and more sedate city than New York and inclined to Conservative ideals. It is one of the most historic cities in the United States, and has a Historical Society of its own. Pop. 1920, 1,823,779.

PHILADELPHIA, RABBATH-AMMON (31° 56′ N., 36° E.), chief town of the Ammonites, Palestine.

PHILADELPHIA ACADEMY OF NATURAL SCIENCES, THE. Founded in 1812 for the advancement of learning in natural science. The Academy library contains over 60,000 volumes and pamphlets. The museum is of first importance, containing over 130,000 specimens of invertebrates. Also insects 400,000 shells over 1,500,000, and a vast assortment of fossils and dried plants. The publications of the Academy fill over 150 volumes. For many years the lectures have been free to the public. A 'Journal' and 'Proceedings' are published. The Academy has taken part in notable scientific expeditions such as Long's Rocky Mountain Expedition, 1819-20, U. S. Exploring Expedition, 1838; Dr. Hayes, and Dr. Kane's Arctic Expeditions, Audubon's Missouri Expedition, The First Peary Expedition, 1891-92, and members of the Academy staff have accompanied expeditions to Mexico and Yucatan. The Jessup Scholarship Fund enables young men to study science in the Academy.

PHILIDOR, FRANÇOIS ANDRÈ (1726-95), a French musician and chess player, *b.* at Dreux. His chief operas are: *Blaise le Savetier*, 1759; *Le Soldat Magicien*, 1760; and *Tom Jones*, 1764. He was regarded as the finest chess player of his age, and published *Analyse du Jeu des Echecs*, 1777.

PHILÆ (24° 1′ N., 32° 47′ E.), island in the Nile, Egypt, near Aswan Dam; covered with interesting temples and other buildings, of which most notable are the great columned hall known as 'Pharaoh's bed,' and the temple of Isis; these are sometimes submerged by waters of the Dam.

PHILARET (*c.* 1553-1633), ecclesiastical name of Fedor Nikitich Romanov, patriarch of Moscow; forced into his position among revolutions in which his powerful house fell; showed himself an able administrator; forbade peasantry to leave their holdings.

PHILATELY (Gk. *philein*, to love, and *ateles*, free from taxation), the systematic collection of postage stamps. The craze started about the time of the first issue of Brit. penny stamps 1840. P. has now become a science cultivated by numerous societies and possessing a large body of lit.

PHILEMON, EPISTLE TO, New Testament, book, written by St. Paul while in prison at Rome, about Onesimus, a runaway slave of Philemon's and convert of Christianity.

PHILEMON AND BAUCIS, name of opera of Gounod's.

PHILIP, the Apostle; often confused with Philip the Evangelist (*Acts* 6₅); mentioned several times in Fourth Gospel.

PHILIP II. (382-336 B.C.), king of Macedon; *f.* of Alexander the Great. Anarchy prevailed after death of P.'s *f.*, King Amyntas, 370. P. secured throne, 359, and speedily restored order. defeated Athens and Thebes at *Choeronea*, 338, and became supreme in Greece. P. instituted Macedonian phalanx.

PHILIP I., PHILIPPE I. (1052-1108), succ., 1060; his vassal, William, Duke of Normandy, made himself stronger than Crown by conquering England; annexed Vermandois, Vexin, Valois, and bought Bourges.

PHILIP II., PHILIPPE AUGUSTE (1165-1223), succ., 1180; m. Isabella of Hainault, descendant of Carolingians, and thus strengthened Capetian dynasty assisted Arthur against John, and on Arthur's death united Normandy, Anjou, etc., to France, 1202-4; recovered Brittany, 1206; repelled attacks of John and emperor, 1211-14. P. was the greatest of the Capetians; gave France unity; built royal castles and fortified towns, making Crown strong.

PHILIP III., THE BOLD (1245-1285), succ., 1270; for some time continued to rule France after wise fashion of his *f.*, Louis IX., but ultimately fell under influence of Charles of Anjou.

PHILIP IV., LE BEL (1268-1314), succ., 1285; united Brie, Champagne, and Navarre to France by marriage with Joan of Navarre; transferred papal headquarters to France; Rom. law adopted.

PHILIP V. (*c.* 1294-1322), succ., 1316, setting aside niece Jeanne; restored order after misrule of Louis X.; codified laws, improved coinage, crushed feudal risings.

PHILIP VI. (1239-1350), *s.* of Charles of Valois; won great victory over Flemings at *Cassel*, 1328, but was unfortunate against English; Hundred Years War began, 1337; important acquisition of Dauphinè, 1349.

PHILIP II. (1527-98), king of Spain; m. Mary of Portugal, 1543, Mary I. of England, 1554; Isabella of France, 1559; Anne of Austria, 1570; his *f.*, Charles V., abdicated, 1555, and P. became chief monarch of Christendom; attack of France and pope defeated by battles of *St. Quentine*, 1557; *Gravelines*, 1558; peace of Cateau-Cambrèsis, 1559; lost northern Netherlands through persecution of Protestants, 1579; Armada defeated, 1588.

PHILIP IV. (1605-65), king of Spain; assisted decline of Spain; governed by favorite Olivares till 1643; Portugal and Catalonia revolted, 1640; France gained territories by Peace of Pyrenees, 1659.

PHILIP (*c.* 1177-1208), Ger. king; Duke of Suabia, 1196; guardian of his nephew, Frederick II., western emperor, 1197; elected Ger. king, 1198.

PHILIP, THE MAGNANIMOUS (1504-67), landgrave of Hesse; one of the first Protestants; became head of Ger. opposition to emperor; founded Marburg Univ., 1527.

PHILIP, THE BOLD (1342-1404), duke of Burgundy, 1363; inherited Artois, Burgundy, Flanders, etc., 1384, and developed their resources; ruled France for Charles the Mad.

PHILIP, THE GOOD (1396-1467), duke of Burgundy; in revenge for his *f.*'s assassination made Treaty of Arras, 1419, with Henry V.; crushed Ghent rising, 1454, by terrible massacre.

PHILIP, JOHN (1775-1851), Eng. Congregationalist missionary to S. Africa; went out, 1818, and denounced treatment of natives by Europeans; influenced public opinion in England.

PHILIP, KING (*c.* 1639-76), chief of Wampanoag Indians, and called by them Metacomet. His father had made an alliance with the colonists of Rhode Island, but Philip abandoned the peace policy and commenced hostilities in 1675. He was vanquished and killed by a company under Benjamin Church.

PHILIPPA OF HAINAULT (*c.* 1314-69), wife of Edward III. of England, 1327; alliance important to Edward's Fr. ambitions; P. encouraged Eng. industries by bringing over Flemish weavers, working Tynedale coal mines, etc.; praised by Froissart.

PHILIPPEVILLE (36° 52′ N., 6° 63′ E.), seaport, Constantine, Algeria, on Gulf of Stora; ancient *Rusicada*.

PHILIPPI (41° 5′ N., 24° 15′ E.), city, ancient Macedonia; scene of victory of Octavianus and Antony over Brutus and Cassius, 42 B.C.; visited by Apostle Paul, who addressed an epistle to its inhabitants.

PHILIPPIANS, EPISTLE TO THE, in New Testament, generally put with Epistles to Philemon, Colossians, and Ephesians as a group forming 'Epistles of the imprisonment.' The genuineness of P. is almost universally accepted, being only denied by very extreme critics. Early testimony to it is good, for it is referred to by Polycarp, and recognised by Justin Martyr, Marcion, and the Muratorian fragment. P. is important as showing a more advanced Christology than Romans and Corinthians.

PHILIPPINE ISLANDS, an archipelago lying in the Pacific Ocean, immediately S. of Formosa and S.E. of Hong Kong. They form part of the group of islands which spread N. of Australia and which include New Guinea, Celebes, Borneo and the Malay Archipelago. Their position is between 21° 10′ and 4° 40′ N. latitude and between 116° 40′ and 126° 31′ E. longitude. Their total land area is about 114,400 square miles and they comprise 7,083 islands, which extend 1152 statute miles from N. to S. and 682 miles from E. to W. The principal islands are Luzon, 40,814 square miles; Mindanao, 39,906; Samar, 5,031; Negros, 4,881; Panay, 4,611; Palawan, 4,027; Mindoro, 3,794; Leyte, 2,722; Cebu, 1,695; Nohol, 1,534; and Masbate, 1,255 square miles. Other islands are the Sulu or Jolo group in the S., the Batan and Babayan in the N., the Cantanduanes to the E. and the Culion in the W. Of the 7,083 islands 462 have an area exceeding one square mile. Thousands of them are unnamed, and only 342 are inhabited.

The islands are generally mountainous and, in common with little regions having physical formations at high levels, have broad plains and valleys between the the elevations. The mountain system is volcanic and belongs to the volcanic ranges of the Pacific Ocean. There are twenty more or less active volcanoes the largest, Mount Apo, in Mindanao being 9,610 feet in height. Others are Mayan Volcano, in Albay, 7,943 feet and Caniaon, in Negros, 7,995 feet. There are a number of other high peaks either non-volcanic or inactive, including Pulog, 9,580 feet; Halcon, 8,481 feet; Malingdang, 8,560 feet; and Santo Tomas, 7,400 feet. Below these heights are numbers of summits exceeding 5,000 feet.

The coasts are bordered with coral reefs and are intricate and dangerous on this account except where charted. The islands have numerous harbors but few are easy of access and safe from all winds. The largest is Manila, whose bay has area of 770 square miles, too wide for safe anchorage, but by the help of piers vessels can tie up to load and unload. Other harbors are Subic and Sorsogan bays in Luzon; Tacloban in Leyte, Iloilo in Panay; and harbors in Cebu, Romblon and Siassi. Manila, Cebu, Iloilo, Zamboagna and Jolo are ports of entry. There are eight land-locked straits.

All the important islands are well watered by rivers. Luzon has the Rio Grande de Cagayan, 226 miles long, and the Rio Grande de Pampagna, which empties into Manila Bay through a dozen mouths. The largest river in the Rio Grande de Mindanao, 330 miles long. Mindoro has sixty rivers and Samar twenty six.

The temperate months are from November to February, when the mean average temperature is 77° to 79° Fahr. The hot months are from April to June (mean average temperature 83°84° Fahr.) and the rainy season extends through July to September.

The islands yield great crops of rice, cocoanuts, sugar, hemp, corn, tobacco and fruits and vegetables. In 1922 the exports of this produce and products thereof had a value of $94,477,603, $59,168,170 of which went to the United States and $35,309,433 to other countries. In the same year goods worth $83,015,369 were imported, $50,113,57 from the United States and $32,901,79 from other countries. There is plent

PHILIPPINE ISLANDS
Scale of Miles
0 20 40 60 80 100
BATAN AND BABUYAN ISLANDS
Same scale as large map
FORMOSA
(To Japan)
Bashi Channel
BATAN ISLANDS
BABUYAN
CALAYAN
CAMIGUIN
LUZON
MANILA
Scale
Miles
TO GUAM, HAWAII AND SAN FRANCISCO
MINDORO
MINDANAO
VISAYAS
SAMAR
LEYTE
CEBU
NEGROS
PANAY
BOHOL
SULU
(JOLÓ)
SULU SEA
CELEBES SEA
BRITISH NORTH BORNEO
PHILIPPINE SEA
LUZON STRAIT
Mindoro Strait
Balabac Strait
Sibutu Passage
Basilan Str.
Bashi Channel
Dilaosa B.
Dingalen Bay
Lingayen G.
Lamon Bay
Balayan Bay
Batangas B.
Tayabas Bay
Ragay Gulf
Albay Gulf
Sorsogon B.
Leyte Gulf
Surigao Strait
Surigao Sea
Illana Bay
Davao Gulf
Sarangani B.
Moro Gulf
Ragay Gulf
Manila Bay
Subic Bay
Batangas B.
Tayabas Bay

of mineral wealth in the islands, much of it untouched, including silver, lead, zinc, copper, coal, petroleum, asbestos, manganese, as well as clay, marble, salt, etc. Virgin forests cover 40,000 square miles and in 1921 there were 73,000,000 acres of public lands. In the same year the railroads had a trackage of 778 miles and there were 6,200 miles of public roads.

The population of the islands in 1918 was 10,350,730. Manila, in Luzon, the capital, had 283,613 inhabitants in that year, and the summer capital, Baguio, 5,462. Other cities are Cebu, population, 1918, 65,300; Albay (Luzon), 53,105; Iloilo (Panay), 47,408; Batangas (Luzon) 41,182; Ormoc (Leyte), 38,247; and Laoag (Ilocos Norte) 38,294. Except for some 62,000 foreigners the entire population is Filipino. The foreigners included 5,776 Americans, 42,802 Chinese, 7,806 Japanese, 3,945 Spanish, 1,148 British, 286 Germans, 182 French, and 125 Swiss. Of the Americans 3,124 were in Manila.

The Philippine islands came into the possession of the United States as a result of the Spanish-American war of 1898 (*q.v.*) at the close of which a treaty was entered into whereby, for the sum of $20,000,000. Spain relinquished them as well as Porto Rico and Guam. By a later treaty, providing for the payment of a further $100,000, the United States acquired other islands in the archipelago. Following the war the Filipinos revolted against American rule, the insurrection lasting from April, 1899, to July, 1902, and required an army of 140,038, including regulars, militia, volunteers and naval forces, to suppress it.

The United States has affirmed and reaffirmed that it has always been its intention to withdraw from sovereignty over the Philippine Islands and to recognise their independence as soon as a stable government could be established. Agitation for independence has proceeded since the islands were ceded to the United States. Major General Leonard Wood, appointed Governor General in 1921, made an investigation of conditions in the islands after assuming office, and recommended to President Harding that the present general status of the people should continue until they had time to absorb and master the power already in their hands. He also urged that under no circumstances should the American government permit to be established in the islands any situation that would leave the United States in a position of responsibility without authority.

Legislation passed in 1916 known as the Jones Act created a new legislature in place of the Philippine Commission, under which the islands have been governed. There is a Senate of 24 members, and a House of Representatives of 91 members. The members of both houses are elected by popular vote except two in the Senate (appointed by the Governor) and nine in the house. The Cabinet offices, except that for Education, are filled by Filipinos. Natives are also being admitted into the civil service in increasing numbers. In 1920 there were 12,074 connected with the government, including 30 acting as chiefs or assistants, as against 760 Americans in official posts.

The islands are divided into 48 provinces, 11 special provinces and 2 chartered cities. Each province has a governor. The government of the towns is practically autonomous. Education is advancing, with 696,324 primary, intermediate and secondary pupils in the public schools in 1919, distributed over 99 school districts. The government also supports the University of the Philippines and the Dominican University at Santo Tomas (founded by Spain in 1611). In 1921-2 the former had 4,718 students and the latter 711. Other educational institutions are the government Normal School, School of Arts and Trade, Nautical School, the Agricultural School at Luzon, and provincial trade schools and ships.

The Philippine islands were discovered by Magellan in 1521. In 1542 they were conquered by Spain, who held them till their cession to the United States in 1898. The natives are supposed to have a common ancestry from the Indonesians and the Malays.

PHILIPPOPOLIS (42° 3′ N., 24° 53′ E.), capital, E. Rumelia, Bulgaria, on Maritza; seat of Gk. and Bulgarian adp's; commercial centre; tobacco, silk-cocoons. Pop. 1920, 63,418.

PHILIPS, AMBROSE (*c.* 1675-1749), Eng. minor poet; wrote plays, pastorals, and miscellaneous verse. He was intimate with Addison and Steele, and had unpleasant passages with Pope.

PHILISTINES, name given in Old Testament to people on the coast of Palestine. Recent research tends to identify them with the Purasati mentioned in Egyptian monuments of Rameses III., about 1200 B.C. They probably came from Crete, the extremely important and only recently discovered civilization of which received its death-blow shortly before this. The incoming Israelites had a long struggle with them, Samuel and David being victorious, but the Philistines lifted their heads again shortly. Gaza, on the way from S. Arabia to Edom, was one

of their chief cities. Tiglath-pileser IV. of Assyria seized it (734 B.C.), and other towns around were conquered. Egypt succ. Assyria as the dominant power. An Arab migration took place about 300 B.C. It is difficult to piece together into a coherent story the fragmentary and contradictory notices of the Philistines and Philistia in the Old Testament. As known to the Hebrews they were either Semites or had absorbed Semitic civilisation. But excavations at Gezer show an undoubtedly Ægean element in their culture.

PHILLIP, JOHN (1817-57), Scot. painter, famed for his Span. pictures; in breadth and virility approaches Velazquez; his best known works are *Collecting the Offering at a Scottish Kirk*, *La Gloria* (National Gallery, Edinburgh), and *The Promenade* (National Gallery, London).

PHILLIPS, ADELAIDE (1833-1882), an English singer; *b.* in Stratford-on-Avon. She was brought to Boston at the age of seven, and that city was, from that time, her permanent home. She sang in opera in Milan, and afterwards in New York, and elsewhere.

PHILLIPS, CHARLES HENRY (1858), Bishop; *b.* at Millegeville, Ga. In 1880 graduated from Walden University and also took a theological course there. Ordained a minister of the Colored Methodist Episcopal ministry. In 1883-84 president of Lane College, Jackson, Tenn. Pastor at Memphis, Tenn., 1885-87, Washington, D. C.; 1887-91; Louisville, Ky., 1891-93. In 1894 presiding elder at Mount Sterling, Ky., District. In 1894-1902 editor of the Christian Index and in May 1902 elected bishop. Since 1891 member of each Ecumenical Conference. Founded churches in California, Arizona, Indiana and New Mexico. Author of *History of the Colored Methodist Episcopal Church*, 1898.

PHILLIPS, DAVID GRAHAM (1867-1911), an American author; *b.* in Madison, Ind. He graduated from Princeton University, in 1887, then took up journalism, being for a time on the editorial staff of the New York Sun, and later London correspondent for the New York World. For a time after that he was private secretary to Joseph Pulitzer, owner of the New York World. He made his initial success as a novelist with *The Great God Success*, 1901, which was followed by other novels equally successful, depicting life in the higher social strata. Among the best known of his other books are *Old Wives for New*, 1908; *The Social Secretary*, 1905; *The Husband's Story*, 1910, and *The Grain of Dust*, 1911.

PHILLIPS, EDWARD (1630†-1695†), Eng. writer; nephew of Milton, whose *Letters of State* he translated; first to edit Drummond's *Poems*, edited various works and wrote two novels.

PHILLIPS, STEPHEN (1868-1915), Eng. poet and dramatist; his *Poems*, 1897 won *Academy* first prize; other poetical works include *Marpessa* 1890; *Christ in Hades*, 1896; *The New Inferno*, 1910; and plays: *Paolo and Francesca* (for Sir George Alexander), *Herod*, *Ulysses*, *The Sin of David*, *Nero*, *The Lost Heir*.

PHILLIPS, WENDELL (1811-84), American abolitionist and orator. *B.* in Boston, Nov. 29, 1811; *d.* there Feb. 2, 1884. He graduated from Harvard in 1831, studied 3 years at Harvard Law School, and was admitted to the bar in 1834. The sight of Garrison being dragged through the streets by a mob in 1835 made him an Abolitionist. In Fanueil Hall, Boston, in 1837, he made a great speech in protest of the murder of E. P. Lovejoy, abolitionist, at Alton, Ill. (*q.v.*). In 1839-40 he opposed organizing the Abolitionists as a political party. He succeeded Garrison as president of the Anti-Slavery Society. In 1870 he received 20,000 votes as labor and temperance candidate for the governorship of Massachusetts. As a lecturer he was widely popular, especially noted were lectures on 'Toussaint-L' Ouverture' and 'Lost Arts'. Equally famous were his orations on Theodore Parker and 'The Scholar' in the Republic at Harvard. A collection of his 'Speeches, Lectures, and Letters' was published in 1864, and a second series in 1892.

PHILLIPS ACADEMY, a preparatory school for boys, founded in 1778, in Andover, Mass., by Samuel Phillips. It ranks as one of the best schools of this class in the country, many of the famous men of the past having been students there. It is especially adapted to the requirements for entrance into Harvard University, to which most of its students go. It has a capacity for 400 pupils, and an endowment of $500,000.

PHILLIPSBURG, a city of New Jersey, in Warren co. It is on the Lackawanna, the Lehigh Valley, the Central of New Jersey, the Pennsylvania railroads, and on the Delaware River, which is crossed by two long railroad bridges connecting the city with Easton, Pa. It is in an important limestone and iron ore region and has iron foundries, machine shops, railroad shops, a rolling

mill, and plants for the making of boilers, locomotives, mowers and reapers. Pop. 1920, 16,923.

PHILLIPS EXETER ACADEMY, a preparatory school for boys, founded in 1782, by John Phillips, in Exeter, N. H., who endowed it with $65,000. Its present endowment fund amounts to $400,000 and it has an annual income of $100,000. Like the Phillips Academy in Andover, Mass., it has turned out many pupils who later acquired great prominence in the professions and public life. Its alumni number over 10,000. Its capacity is for 300 pupils.

PHILLPOTTS, EDEN (*b.* 1862), an English novelist, *b.* at Mount Aboo, India. He became a clerk in the Sun Fire Insurance Office, 1880-90, and then, after studying for a time for the stage, he adopted literature as a profession. In his novels Mr. P. gives a vivid and often terrible picture of Devonshire life. Most of his novels deal with Devonshire, typical examples being *Children of the Mist*, 1898; *The River*, 1902; *The American Prisoner*, 1904; *The Secret Woman*, 1905; *The Portreeve*, 1906; *The Mother*, 1908; *The Thief of Virtue*, 1910; *The Forest on the Hill*, 1912; *Widecombe Fair*, 1913; *The Judge's Chair*, 1914; *Old Delabole*, 1915; *The Spinners*, 1918; *Storm in a Teacup*, and *Evander*, 1919; has also written plays and some excellent stories of boyhood, including *The Human Boy*, 1899; *The Human Boy Again*, 1908.

PHILO, Jewish philosopher, contemporary of Christ; lived at Alexandria, and forerunner of Alexandrian school. Little is known of his life, save a visit to Rome, 40 A.D. His philosophy blends Platonism and Judaism. The Jewish element is the claim to divine origin of Mosaic writings, through which Jews possess absolute truth in religious matters; everything right and good in Gk. philosophy previously taught by Moses. Philo adopts the allegorical method of interpreting the Old Testament customary among cultivated Alexandrian Jews.

PHILOCTETES, in Greek mythology, was the armor-bearer of Hercules, from whom he inherited his bow and arrows. At the beginning of the Trojan War, P. was left bebind at Lemnos, but Helenus having prophesied ten years later that Troy could only be taken by Hercules' arrows, Ulysses returned for him. See Sophocles' *Philoctetes.*

PHILOLOGICAL ASSOCIATION, AMERICAN. Founded in 1869 at Poughkeepsie by William D. Whitney of Yale University, an outgrowth of the Oriental Society of the Oriental Department. The purpose of the association is to advance, and diffuse, knowledge of philology. The association publishes annually *Transactions* and *Proceedings.*

PHILOLOGY, the study of languages, especially as regards their historical development and their mutual points of contact, their internal structure and external groupings. Though it has of late acquired a new form, it is an old science, pursued with good results in anc. Greece, in Alexandria, and in Rome. It lay dormant till the Renaissance, when it acquired a great impetus, especially in Italy, France, and Germany. The great names in this period were Budè in France, Lambin and Muret in Italy, Scaliger and Casaubon, who eventually settled in England, Justus Lipsius of Louvain, and Erasmus.

The beginnings of *comparative philology* were an attempt, often repeated but without much success at the time, to establish a common origin of Greek and Latin, possibly in Hebrew. In 1786 an Eng. scholar, Jones, published conclusions ascribing a common origin to Greek, Latin, Gothic, Sanskrit, and Celtic, and his work, taken up by Franz Bopp, and later by Jakob Grimm, became the foundation of the modern science of philology. Grimm in particular crystallized much of the loose knowledge of his day, and gave his name to that law of philology which, so far as Teutonic languages are concerned, absolutely revolutionized the scientific study of languages. This discovery led to a much stricter investigation into the phenomena of philology and the placing of this as of other sciences under definite general laws.

One of the results of this was a much more accurate classification of the languages of the world than had been possible before, though philologists differ as to the principle on which classification should be made. Some would distinguish between isolating, agglutinative, and inflectional languages, but it is perhaps best to rest satisfied with the actual grouping of history, and arrange languages according to their genealogical connections. Among the best-determined linguistic families are: (1) Indo-European, including Sanskrit, Persian, Greek, Latin, French, German, English, Norse, Welsh, Gaelic, etc.; (2) Semitic, including Arabic, Hebrew, Assyrian, Aramaic, Ethiopic, etc.; (3) Indo-Chinese, including Chinese, Tibetan, Siamese, etc.; (4) Ural-Altaic, including Turkish, Hungarian, Finnish, etc.; (5) Dravidian, in S. India, including Tamil, Telugu, etc.; (6) Malay-Polynesian; (7)

Bantu, in S. Africa, including about 150 languages.

PHILOSOPHER'S STONE. See ALCHEMY.

PHILOSOPHICAL SOCIETY, THE AMERICAN. The oldest learned society in America. It originated in 1727 as a club for mental improvement, and is referred to by Franklin in his writings. Franklin thought that such a society should include members from all the colonies. Meetings were held in 1844 and the society was reorganised April 25, 1766, under the name of 'American Society for the Promotion of Useful Knowledge.' The American Philosophical Society combined with it Jan. 2, 1769, with Franklin as president. John H. de Magellan in 1785 donated 200 guineas to the society, the interest to be used for a gold medal awarded yearly for the best discovery, or improvement in navigation, or in natural history. The membership is limited to 15 residents of the United States and 3 foreign. At the annual general meetings distinguished Europeans are invited. The society publishes *Transactions* and *Proceedings*.

PHILOSOPHY, in the widest sense, is the reference of any set of phenomena to its determining principles, *e.g.*, the philosophy of invention, of digestion, natural philosophy; in its technical sense, practically equivalent to metaphysics, an account of the fundamentally real, of the laws applying to all phenomena. The meaning and scope of the term have varied in different ages and among different writers. It was first used by Pythagoras as the disinterested pursuit of knowledge. All branches of knowledge were at first parts of philosophy; thus Aristotle included mathematics and physics in its scope. Later, as knowledge increased, the special sciences became independent, and the task of philosophy was to co-ordinate the principles of each science, to harmonize the claims of their postulates, so far as conflicting. Further, since Gr. thought sought the real substance underlying the phenomena of sense, philosophy approximated to ontology—the science of being as being. If, however, as by modern empiricists, it is held that sensible objects and their laws may be known, but not any ultimate ground beyond phenomena, that things *are* only as they are *known*, philosophy then becomes epistemology—an examination of the forms and categories of human thought. And great stress is laid on epistemology, even by those who oppose this scepticism and seek the ultimate end of the universe. Besides these inquiries, philosophy is taken to include logic, ethics, aesthetics, psychology, sociology, philosophy of law, of religion, of history. Certain of these have two aspects, and only as far as they deal with the fundamental nature of existence are they strictly parts of philosophy; in other respects, they are separate sciences. Thus, psychology is experimental science and philosophical investigation of the knowing mind; ethics is natural history of moral ideas, metaphysical theory of obligation; aesthetics is branch of physiological psychology and a philosophy of the beautiful.

PHILOSTRATUS, name of several Gk. sophists, especially—(1) The Egyptian, of the time of Cleopatra; (2) P. Verus, in the I. and II. cent's A.D.; (3) Flavius P., *s.* of preceding, taught at Athens and Rome; author of *Life of Apollonius of Tyana, Lives of the Sophists*, etc.

PHILOXENUS OF MABBOG (fl. latter half of V. cent.), Syriac writer and fervid upholder of the Monophysite doctrine. The work by which he is best remembered is his rendering of the Bible (the so-called *Philoxenian Version*), long the standard version of the Monophysites.

PHILTRE (Gk., from 'to love'; Lat. *philtrum*), a love potion or drug, supposed to have the property of creating affection.

PHIPS, SIR WILLIAM (1651-95), gov. of Massachusetts, 1692; commanded force which captured Port Royal from French, but met no further success, 1690.

PHIPPS, HENRY (1839), Manufacturer; *b.* at Philadelphia, Pa. Educated in the public schools of Pa. In 1856-61 worked as office boy and bookkeeper for a firm of spike manufacturers. Partner in a firm and agent for a powder concern in 1861 and was also a partner in a small iron mill. In later years associated in business with Andrew Carnegie and in the concern he made a fortune. Interested in the tuberculosis movement and gave large conservatories to different cities. Presented Phipps Institute to University of Pennsylvania and to Johns Hopkins gave a psychiatric clinic. Also gave one million dollars to New York.

PHIPPS, LAWRENCE COLE (1862), United States Senator; *b.* at Washington County, Pennsylvania. Graduated in 1878 from high school at Pittsburgh. In 1879 began work in the iron mills owned by Carnegie and Company and resigned as vice-president in 1901. Removed to Denver, Colo., and there founded the

Agnes Memorial Sanatorium for tuberculosis in 1904.

PHLOGISTON, the name formerly applied to a hypothetical substance supposed to be contained in all combustible bodies, and consisting of the source of element of heat. The name is often given to a form of mud obtained in Colorado, used in the treatment of inflammation.

PHLEBOTOMY, or **VENESECTION**, the act of letting blood by opening the vein, formerly the general method of treating diseases, but now limited to general or local plethora.

PHLEBITIS, inflammation of a vein; may follow injury to the wall of the vein, debilitating diseases in which there is a feeble circulation, or may occur in connection with a septic wound. A clot, or *thrombus*, is apt to form, which may be carried to the heart or lungs with serious results.

PHLOX, a genus included in the Polemoniaceae, and a favorite garden flower for borders and the like. The inflorescence is a cyme.

PHOCAS. See BYZANTINE EMPIRE.

PHOCÆA (38° 40′ N., 26° 43′ E.), ancient city, on Ægean, Ionia, Asia Minor.

PHOCION (*c.* 402-317 B.C.), Athenian politician and general; opposed patriotic resistance to Philip of Macedon, but strove to check war party, who brought on fatal battle of *Choeronea*, 336, and war with Antipater.

PHOCIS, ancient district in N. Greece, bounded by Corinthian Gulf on S.; mountainous and unproductive; chief mt., Parnassus; river, Cephissus, with productive valley; also fertile Crisaean plain; possessed Delphic oracle.

PHŒBUS. See APOLLO.

PHŒNICIA, coast region, Syria (*c.* 32°-36° N., 34° 45′-36° 30′ E.), Like the rest of Syria, Phoenicia was under the overlordship of Egypt from about the beginning of the 16th cent. B. C., and suffered from the invasions of Hittites from Asia Minor in the two following centuries. Egyptian rule began to decline soon after death of Amenhotep III. (*c.* 1392), owing partly to religious innovations of his successor, and partly to continued aggression of northern invaders. Soon afterwards Phoenicia ceased to be a dependency of Egypt, and became a flourishing and independent country. Tyre and Sidon became most important cities, but colonies were also established on the Mediterranean islands and the coasts of N. Africa, as at Carthage, Hippo, Utica, Tripoli. The Phoenicians were a trading and colonizing race; they are said to have had dealings with Solomon, and to have visited Britain in search of tin.

The country was invaded by Assyrians under Assur-nazir-pal in 9th cent. B.C., and from this time till late in the 7th cent. was a dependency of Assyria; Assyrian period was at first marked by peaceful prosperity, but in 8th and 7th centuries numerous revolts took place, and about 630 Phoenicia again became virtually independent. Subdued by Nebuchadrezzar (*c.* 605 B.C.), Phoenicia became part of Babylonian Empire, in the conquest of which by Cyrus of Persia it was included (537 B.C.). As part of the Persian Empire, the various states were ruled by their own princes, and the country enjoyed considerable prosperity; it was still dependent on Persia at the coming of Alexander the Great in 333 B.C., after whose victory at Issus several of the states at once surrendered; Tyre, however, opposed Alexander, and was besieged, and after a magnificent resistance compelled to submit to the conqueror. The decline of Phoenician trade begins about this time, when Gr. colonies were planted everywhere on Mediterranean coasts.

After Alexander's death part of Phoenicia passed to Egypt, and afterwards belonged, for a short time in the 3rd cent. B.C., to the Seleucids; most of it subsequently came into the possession of the Ptolemies, and in 1st cent. B.C. the whole was among the dominions of Tigranes of Armenia. It was conquered by Pompey in 64 B.C., and became part of the Roman province of Syria, with which its subsequent history is coincident.

Phoenicians were of Semitic race; they acted as the carriers of the world, and had large distributing trade between E. and W.; among their most important industries was dyeing with Tyrian purple, which was obtained from the murex, linen weaving, glass making, and metal working were also carried on. Most of their arts and crafts were taken from other nations; and the fact that they spread abroad so much useful knowledge is their chief claim to the gratitude of the world Ægean civilization is supposed to have been derived from contact with the Phoenicians, who in passing on the knowledge derived from Egypt and Babylonia, and possibly also in passing on the alphabet, form an important link in the chain of civilization.

PHŒNIX, fabulous bird of Egypt which lived for 500 years. Out of the ashes of the dead p. a new p. arose. The

p. built his own pyre out of rare Arabic spices. The p. was especially associated with Heliopolis in Egypt.

PHŒNIX, a city of Arizona, the capital of the State and the county seat of Maricopa co. It is on the Sante Fe, Prescott and Phoenix Railroad. The city has large commercial interests and an extensive trade in live stock, grain, hay, olives, and honey. Among the public buildings are the Capitol, Federal building, city hall and court house. Pop. 1920, 29,053.

PHŒNIX ISLANDS (3° 11′ S., 170° 40′ W.), group of small Brit. islands in Pacific.

PHŒNIXVILLE, a town of Pennsylvania, in Chester co. It is on the Pennsylvania, and the Philadelpbia and Reading railroads, and at the junction of French creek and the Schuylkill river. Its industries include steel mills, a silk mill, and bridge works, and manufactures of copper and cotton goods. There are several private schools. Pop. 1920, 10,484.

PHONETICS is the science of speech sounds, or of voice, *i.e.* embracing articulate and inarticulate sounds, but the former signification is the more general. The science has many immediate applications. By phonetics a correct pronunciation of foreign languages is best acquired, defects of speech are remedied, and the deaf and dumb are taught articulate speech. In this last department marvellous progress has been made in recent years. Moreover, the phonetician can by phonetic symbols register speech in languages that have no written form. In phonetics there are two methods of procedure. The external method describes the effect of sounds on the ear of the listener. (The descriptions of sounds by this so-called acoustical method are often vague, but for testing and comparing the method is very useful.) The internal method describes the position occupied by the vocal organs in the production of sound. This latter method is usually adopted. A detailed knowledge of the anatomy of the vocal orgnas is necessary.

Speech sounds fall into two main classes: (1) sounds which are produced by the passage of the breath through the mouth: (2) sounds which are produced by the passage of the breath through the nose. These may be combined, as in the French nasalised vowels. Numerous subdivisions of sounds produced by these two methods are determined by the extent and nature of the check to which the breath passage is subjected—*e.g.* in vowel sounds the breath has a more or less free passage through the throat and mouth, in the sound *f* there is an observable friction, and in the sound *p* the passage is blocked.

The following are the principal groups of articulate sounds: (1) *Stop Consonants,* where the passage of the breath is blocked and then released (*p, t, k, b, d, g*); (2) *Spirant Consonants,* where the stream of breath is checked by the lips and point or back of the tongue (*f, wh, th, kh, v, w, dh, gh*); (3) *Sibilants,* where the blade of the tongue acts on the passage (*s, z, sh* and *zh*); (4) *Nasals,* where the mouth passage is closed by the lips or tongue, and the breath escapes by the nasal passage (*m, n, ng*); (5) *Vowel* sounds depend on the point of articulation of the tongue (tip, blade, or back) and its vertical position (high, middle, and low). The part played by the lips and nasal passage is also taken into account. Various mechanical appliances are used in determining the position of the vocal organs, *e.g.* the laryngoscope (a mirror inserted in the mouth and throat), the X-rays, the palatogram (a thin plate inserted in the mouth which takes a chalk impression at the point of contact). The sounds are then registered by adequate phonetic symbols.

The writing of all languages is at first phonetic, but orthography, which is by nature conservative, soon loses sight of the spoken sound. The written language is then said to be unphonetic, *i.e.* the pronunciation of the spoken word and the phonetic symbols of the written word no longer correspond—e.g. *knife,* the initial consonant of which was formerly sounded. The divergence in English is extremely great. Hence various attempts to institute a reformed spelling system have been made. Such reforms are not really an innovation, but a readjustment of the written symbol to bring it into its right relation to the spoken sound.

PHONOGRAPH. See GRAMAPHONE.

PHONOGRAPHY. See SHORTHAND.

PHONOLITE, CLINKSTONE, an igneous rock, composed of sanidine and nepheline, and belonging to Tertiary period; colors—green, grey, and brown; splits easily into slabs which, when struck with hammer, give metallic ring or clink, hence other name.

PHORMIUM, a genus, included in the Liliaceae, which possesses isobilateral leaves. These are very resistent in character, the fibre termed New Zealand flax being derived from those of *Phormium tenax.*

PHORONIDEA, class or aninals containing only the genus *Phoronis* with

about six species. They are small marine animals which build leathery tubes encrusted with particles from the sea-floor, diatoms, sponge spicules, sand grains, and such-like.

PHORORHACOS, an extinct land bird belonging to the group Stereornithes, Carinate birds the remains of which are found in the lower Tertiaries of S. America.

PHOSPHATES, the most important of all fertilizers, consisting essentially of various forms of calcium phosphate ($Ca_3(Po_4)_2$). Bones were supplemented by mineral phosphates in 1840, the production of rock phosphate reaching 7 million tons in 1913, the chief producers being U.S. and North Africa. Rock phosphates are nearly all converted into superphosphate by action of sulphuric acid, before being used as a manure. Basic slag, a by-product in steel manufacture, is also a calcium phosphate, and if finely ground is the greatest rival of superphosphate. The ash of wheat contains as much as 50 per cent., while that of oats contains about 45 per cent., and that of peas about 33 per cent.; hence the value of such applications as bone, Peruvian guano, and superphosphate of lime.

PHOSPHORESCENCE is the emission of a pale light—which may be white, orange, green, or violet—without apparent combustion. It is sometimes due to slow oxidation (chemi-luminescence) or to electric excitation (electro-luminescence), but otherwise it is probably the accompaniment of molecular readjustment after the strain produced by absorbed light energy. Diamond, when moderately heated, 'Bononian phosphorus' (barium sulphide), and Balmain's luminous paint (calcium sulphide) are phosphorescent in the latter sense. The phosphorescence of phosphorus and of organisms is due to oxidation. Fungi cause phosphorescence of decaying wood, minute organisms that of the sea, oxidation of fat probably that of glowworms, fireflies, centipedes, and deep-sea fishes.

PHOSPHORIC ACID, the acid usually obtained by burning phosphorated hydrogen in air or oxygen. It is used in medicine in the form of a solution.

PHOSPHORUS ACID, an acid obtained by exposing phosphorus to moist air. It usually exists in the form of a thick syrup, but it may also be obtained crystallized.

PHOSPHORUS, P=31.04 non-metallic element; occurs combined, chiefly as calcium phosphate, $Ca_3(PO_4)_2$, in phosphorite, apatite, coprolites, bone ash; widely diffused; essential to plants and animals; isolated from urine by Brand in 1669.

Phosphorus is obtained by treating in an electric furnace a mixture of finely divided calcium phosphate, sand, and coke. Crude phosphorus distils over, is collected under water, and subsequently purified.

Properties.—Phosphorus exists in several allotropic forms.

(1) White phosphorus is almost colorless, translucent, and wax-like; crystallizes in octahedra sp. gr. 1·83, m.p. 44·3° C., b.p. 290° C. Molecule of vapor below 1,500° C. = P_4; above, dissociation into P_2 molecules occurs. Molecule in solvents is P_4. Phosphorus is nearly insoluble in water, easily soluble in carbon disulphide; ignites at 45° and burns to P_4O_{10}; kept under water. Luminous in dark (phosphorescence) owing to slow oxidation. When vaporized with steam shows greenish phosphorescence; peculiar smell; very poisonous, 1 decigram has caused death; vapor attacks jaw (*necrosis*, 'phossy jaw'). Use for matches now prohibited. Used as vermin killer, for chemical experiments, and as a nerve tonic.

(2) Red phosphorus ('amorphous'), is formed by action of light and heat on white phosphorus; change is promoted by a trace of iodine, and is rapid at 140-250° C,. but reversed at higher temperature; dark reddish brown, partially crystalline, tasteless, odorless, insoluble in carbon disulphide, not poisonous, oxidized slowly in moist, hot climates. Used for safety matches.

(3) Scarlet phosphorus (Schenck's made by heating white phosphorus with the tribromide. Used for matches that strike anywhere (P_4S_2 also employed).

Hydrides: PH_3 (gas), P_2H_4 (liquid), $P_{12}H_6$, P_9H_3 (solid). *Chlorides*. PCl_3, PCl_5, $POCl_3$. *Oxides*: P_4O_6, P_2O_4, P_4O_{10}. *Oxyacids*: H_3PO_2, H_3PO_3, $H_4P_2O_6$, H_3PO_4 (HPO_3, $H_4P_2O_7$).

PHOTIUS (*c.* 820-92), patriarch of Constantinople; app. in irregular way; refusal of Pope Nicholas I. to confirm his election led to Council of Constantinople 867, and secession of Eastern Church; deposed after death of emperor, 867, but restored, Pope John VIII. consenting; new council at Constantinople, 879, attacked Rom. doctrines; second exile, 886. cultured scholar.

PHOTO-CHEMISTRY. That branch of chemistry which deals with chemical reactions included or maintained by the action of light. Such reactions are very numerous, and occur widely in nature. The most striking and important example is the formation of starch and

sugars from carbon dioxide and water, which occurs in the leaves of plants. This action does not take place in the dark and it has been proved that chlorophyll, the green coloring matter in plants, plays an important part in the synthesis. Chlorophyll is not formed in plants protected from sunlight. See BIOCHEMISTRY. Other familiar examples of photochemistry are found in the various processes by which photographs are produced. The preparation of both negatives and prints depends upon chemical changes brought about by the action of light. Silver salts, which are largely used in photography, are very susceptible to light. Silver chloride which is white when first prepared, turns purple and then brown in sunlight, and is finally reduced to silver. This is an example of decomposition brought about by light, but there are many syntheses which take place either very slowly or not at all in the dark, but quite rapidly, sometimes violently, in sunlight. Chlorine combines with methane with reluctance in the dark, but with explosive violence in sunlight. Chlorine and hydrogen do not react at all in the dark, but combine very slowly in diffused daylight and rapidly in bright sunlight. All parts of the spectrum possess chemical activity, but the most active rays are the violet and ultra-violet, or so-called actintic rays.

PHOTO-ELECTROTYPE. The process of utilizing photographic phenomena to produce a matrix to be used in the preparation of an electrotype is known by this name. Prints produced by this process are almost equal to photogravure prints. Being an expensive and rather complicated process which requires considerable skill in manipulation it is used only for the better grades of illustrations.

The method of John Moss, invented in 1871, is well known, and may be described as follows: A glass plate with a gelatine coating which has been sensitized by treatment with potassium bichromate, is exposed to light under a black and white negative of the illustration to be reproduced. The light passing through the clear portions of the negative (the shadows of the original), affects the gelatine in such a way that it will not swell when subsequently soaked with water, as does the gelatine under the opaque parts of the negative which were protected from the light. After the soaking operation, the surface which now consists of the design in relief, is hardened with iron sulphate and painted with asphaltum. Over this hot wax is applied. The wax and asphaltum are stripped off together, and used to make a matrix on which copper is plated as in making any electrotype.

PHOTO-ENGRAVING, method employed to secure an engraved plate for printing by the chemical action of light on especially prepared surfaces. Gelatine, asphaltum and albumen are the substances usually employed in the process. There are two principal methods, the relief and the intaglio. In the former, the ink for printing is deposited upon the projecting parts of the block or plate, while in the latter it enters the incised lines. When a metal plate is covered with a thin layer of asphaltum and exposed to the light under a negative the dense parts become hardened and the result is a relief plate; when the whites are hardened under a positive an intaglio plate is produced. Albumen, when combined with potassium bichromate, results in the same effects as when arphaltum is used. Gelatine also mixed with potassium bichromate has the power of resisting mordants according to the degree of exposure. The entire process of photoengraving rests upon the changes undergone by these substances under the exposure to light. The soluble parts are washed off and the remaining insoluble part forms the plate or block for printing.

The half-tone process, so commonly and satisfactorily used for reproductions, depends for its qualities upon the interposition of a half-tone 'screen' between the object photographed and the negative. This screen is made up of finely ruled pieces of glass so put together as to make of the intersecting lines a great number of tiny dots. These dots sometimes reach as many as 200 to the inch, though for ordinary magazine work the dots vary from 120 to 150 to the inch and for newspaper work range from 70 to 100. The dots form a grain to which the ink may cling. In making the half-tone, a polished plate, usually of copper, which has been coated with a preparation of fish glue, bichromate of ammonia, albumen and water, is brought into contact with a negative in reverse made with the screen. It is then exposed to light, and later the parts which have been protected from the light by the heavier part of the negative are washed out. The plate is then burned in and is ready for etching. The invention of the process is credited to F. E. Ives of Philadelphia, 1885-86, though many improvements since then have brought it toward perfection.

Photogravure, which is due to methods just the reverse of those employed in the half-tone process, is one of the latest and most beautiful developments of photoengraving. It has a sumptuous,

velvety quality that delights the eye and makes it especially suitable for the reproduction of paintings. In this process a copper plate coated with albumen, mixed with a bichromate, or asphaltum is exposed to light under a black and white positive, resulting in the hardening of the parts under the clear portions of the positive and the solubility of the parts under the dense portions. A grain can be secured by sprinkling the plate with powdered resin.

The three or four color process, by which direct reproductions can be made of colored originals is based upon the theory that all the colors in the chromatic scale can be derived from the three primaries, red, blue and yellow. Ray filters are used that permit only the desired colors to affect the photographic plates. The plates are then printed one upon the other and, theoretically at least, should form a perfect reproduction of the original, though as yet the results are only approximate.

PHOTOGRAPHY, name given to process by which rays of light reflected, or emitted by objects, are used to produce, by chemical means, a permanent picture of the object. It is the outcome of many attempts to fix the vivid pictures produced in the 'Camera Obscura,' which has been known since the 16th cent. The camera is a light-tight box, in one side of which is fitted a lens which projects images of external objects on to the opposite side where a plate is fixed. The first permanent pictures were made by Daguerre, in France, in 1839. His process gave one picture, a positive on a plate of silvered copper, for each exposure. Daguerre was also the first to discover the *latent image.* He had attempted to secure a visible image on the plate by exposure in the camera, with little success; but he found by accident that if a plate which had been exposed in the camera for a very short time, and showed no trace of an image, was then exposed to the vapor of mercury a complete image *developed,* and became visible. Henry Fox-Talbot, in England 1841, discovered a process of making negative images on paper which were developed by gallic acid. These *negatives* represent the light parts of the subject as black or opaque, and the dark parts as white or transparent, and by placing this negative, after treatment to make it translucent, on a fresh piece of sensitive paper, and esposing to light, a positive print is obtained which represents the lights and shadows of the picture in thrir proper relation. It is from this process, rather than from the process of Daguerre, that modern photography has developed. The next advance was the use of glass plates in place paper, which was rendered possible the adoption of an organic substance carry the sensitive salts. Albumin w first used, but was soon displaced, f negatives at least, by collodion, whi was introduced by Scott-Archer in 185 These collodion plates were exposed a developed while still moist with t solution of silver nitrate used to sensiti them, and from this they were know as '*wet plates,*' ir '*wet collodion plate* to distinguish them from the gelati '*dry plates*', which came into use abo 1880. The wet collodion process is st largely used for special purposes such the various reproduction processes.

The gelatine *dry plate* is the only pla known to the majority of photographe It consists of a glass plate coated on o side with a film of gelatine containi the sensitive bromide of silver in t form of an emulsion. The film contai no free silver, and is used dry. T image formed by exposure in the came is invisible or *latent,* but, when treat with a suitable *developer,* the parts of t film which have been altered by lig become dark and opaque owing to t reduction of the silver bromide ir metallic silver in proportion to t amount of light action. The unalter bromide is next dissolved by the *fixa solution,* which is sodium thiosulpha ('*hypo*'), leaving the opaque silver the film. After washing and drying, t negative is ready for the process making prints.

If the negative is too dense it may 'reduced' bv treatment with solutio having a solvent action on the sil image, whilst if it is too thin and flat can be 'intensified' by treatment wh increases the density of the silver ima or changes its color, increasing the c trast at the same time.

All the processes mentioned have t disadvantage that they are much m sensitive to blue and violet light than green, yellow, and red, the result be that the latter colors appear much da er, and the former much lighter on print than they ought. In 1873 Vogel discovered that certain dyes h the property of altering the color-se tiveness of plates treated with the moving the region of maximum se tiveness towards the red end of spectrum. Plates so prepared are kno as *orthochromatic* or *isochromatic,* and much more sensitive to yellow and gr than ordinary plates, but the sensit ness to blue remains so strong that is necessary to interpose a 'light-fil or 'screen' of a yellow color to subd the blue and violet. *Panchrom* plates are a further development, a are sensitive even to deep red. Th

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equire a strong yellow or orange filter during exposure, and must be handled and developed in almost total darkness.

Films consist of thin transparent celluloid, coated on one side with gelatino-bromide emulsion. They are either cut to the standard sizes and used like plates, or the celluloid is in the form of a long band on which successive exposures are made. The first are known as 'flat,' and the second as 'roll' films. The advantage of the latter is that, being wound on a spool together with a longer band of opaque black paper, fresh spools can be inserted in the camera, and exposed ones removed, in ordinary daylight. Films are prepared of the same speed as plates, and are made orthochromatic in the same way.

The Camera.—The simplest form of photographic camera has already been described.

Another type of camera has extensible sides so that the distance between lens and plate can be adjusted to focus objects at any distance. The lens may also be made to be raised or lowered in relation to the plate, to 'swing back,' to enable the plate to be kept vertical when the camera has to be tilted, and so on. A form of camera largely used in press photography is the *reflex*, inside of which is a mirror inclined at an angle of 45°, which reflects the image on to a ground-glass screen in the top of the camera. The picture may be observed on this screen, exactly as it will appear on the negative, up to the moment of exposure, when the mirror flies up and allows the light to fall on the plate.

The photographic lens is made in many types; for portraiture, a lens of long focus and large aperture; for interiors and other confined situations, a lens of short focus and great covering power (wide-angle), and so on. The *telephoto* lens enables large scale photographs to be made of subjects impossible to approach closely, such as mountain peaks, architectural details, and wild animals.

Printing.—The print is usually made on sensitized paper, which may be prepared with a number of salts other than the bromide and iodide of silver used in making negatives.

The first class are called *bromide* or *development* papers, and consist of stout paper coated with a bromide of silver gelatine emulsion similar to that used for dry plates, but not so sensitive. It is developed and fixed in the same way as plates, and is, indeed, coated on glass and used in making lantern slides.

Contact prints are made by placing the paper in contact with the negative in a printing frame, exposing to weak white light for a short time, and developing. This paper is also suitable for making *enlargements*. The negative is placed in an enlarging camera which projects the image, of any desired size, on to the paper. A variety of this paper made with specially slow emulsion is known as *gaslight* paper, as all the operations may be conducted by artificial light.

The normal color of a bromide print is neutral black and white, but the color may be altered by modifying the developer, or by *toning* after development. Bromide paper is prepared with a great variety of surfaces, from a high gloss to that of very rough drawing paper. A second class of papers are known as *print-out* papers, or 'P.O.P.,' as the image becomes visible as exposure proceeds. The sensitive salt employed is silver chloride. It is suitable only for contact prints. When the picture appears slightly stronger than is required it is fixed with 'hypo,' but, as the color of the image is unpleasant, it is usual to tone the print with a solution containing gold chloride before fixing. This produces tones ranging from reddish brown to purple black. A variety of this paper known as *self-toning*, contains a toning salt in the emulsion, which tones the image when the print is placed in the fixing solution. 'Plantinotype' paper is used for contact prints, but while the image becomes visible during exposure it must be developed. The sensitive salt is platinum, and it is developed in potassium oxalate, and fixed with weak hydrochloric acid. The prints are very permanent, beautifully soft and delicate, the color ranging from black to warm sepia, with a matt surface.

A very large number of printing processes are based on the action of light on bichromated gelatine, gum, albumin, and similar substances. If the substance is readily soluble in water, the effect of light is to make it insoluble. This is the principle of the *carbon* or *autotype* process, also the *gum-bichromate* process. An insoluble pigment is mixed with the bichromated gelatine or gum, coated on paper, and exposed in contact with the negative. The print is developed in warm water, which dissolves the soluble portions, leaving a graduated thickness of insoluble pigment-bearing film representing the various shades of the picture. If the print is dabbed over with a greasy ink, the ink does not adhere to the soft, moist parts, but only to the more or less hardened portions in proportion to the amount of light action. This is the principle of the *oil* process, and of the *collotype* reproduction process, in which the ink image is transferred to paper in a special printing press.

By a modification of the above method a print may be produced in high relief,

and this is the principle of various processes for producing photographs in relief, also the *Woodburytype* reproduction process.

Another modification is to mix a hygroscopic substance, such as glycerine, sugar, or honey, with the bichromated colloid. After exposure the print is exposed to moist air, when the parts unaffected by light absorb the moisture and become sticky, while the affected parts remain dry. If a very fine powder is brushed over the print it will adhere in inverse proportion to the amount of light action, thus producing a negative from a negative. It is chiefly used in *photoceramic processes*—*i.e.*, making photographic prints on china and porcelain.

An interesting print-out paper for the reproduction of colors has been produced by Dr. Smith. It is prepared by coating paper with a black film containing three dyes which combined appear black. These dyes bleach out in white light, but as each dye is bleached only by the color rays which it *absorbs*, the black film bleaches to red under red glass, green under green glass, and so on, and if exposed under a colored transparency it will give a fair reproduction of the colors. The printing is slow, and there is some difficulty in fixing the colors satisfactorily, but these faults will probably be remedied.

Color Photography.—The production of photographs in natural colors has been attempted by experimenters from Daguerre and Fox-Talbot onwards, but no advance was made till 1861, when Clerk Maxwell suggested a method based on the Young-Helmholtz theory of color vision, that our eyes perceive color by the stimulation of one or more of three *color sensations*. Each sensation is stimulated by a different range of vibrations, approximating to red, green, and blue-violet. White is perceived by the equal stimulation of all three sensations, and colors by stimulation in varying degree of one or more sensations. Clerk Maxwell showed that if negatives were made recording respectively the amount of red, green, and violet contained in the camera image, and if the positives were projected by lanterns so that the images coincided, using for the projection of each the same colored light as had been recorded in the negative, then the picture would appear in its natural colors.

Clerk Maxwell's results were imperfect, but the principles he demonstrated are the basis of almost all modern processes of color photography.

In addition to projection by three lanterns, the images may be combined by projecting them in rapid succession, as in the cinematograph, the stimulation of each sensation recurring so rapidly as to blend. Another method employed in Ives's 'Kromskop,' in wh the three images are superimposed a combined by an arrangement of tra parent reflectors, but the most conv ient way is to make the three-co sensation records in very minute p tions side by side on one plate. T divisions of color are too small to be d tinguishable by the eye, and only color produced by the combination seen. The two disadvantages of t method are that (1) the picture must in the form of a transparency, and the great loss of light, which even in white amounts to two-thirds. Of seve processes making use of this method autochrome plate of Messrs. Lumier the most widely used. In this plate compound filter consists of starch gr ules, dyed in three batches and mixed the proportions which approximate white when spread on glass in a film thickness of a single grain. The p chromatic gelatine emulsion is spread this film, and the plate is placed in camera with the glass side next the l so that the light passes through colored grains before reaching the pla A yellow filter is required in the lens correct the excessive blue sensitiven of the plate (see above). The negat is developed, converted into a positi and the image appears in its natu colors.

All the above methods are known '*additive*,' as one light is added to other; but the three-color princi may also be employed by subtracting ors from white, which has the advant of enabling prints to be made on pa as well as in the form of transparenc The negatives are made in exactly same way, through red, green, and vi filters, but the colors used for the p are the complementaries to those. basis, which may be paper, porcel or glass, reflects or transmits red, gre and violet light (*i.e.*, white), and it required to subtract from it successiv these colors in the proportion, recor in their respective negatives. This done by making a print from e negative, by the carbon process ge ally, and transferring the tissues on the paper or glass, one over the ot making them coincide. The colors the tissues must be such that each sorbs the rays passed by the filter u for that negative, and reflects the r passed by the other two filters. Th colors are found to be for the red fi print, a greenish blue; for the gr filter print, a magenta pink; for violet filter print, yellow. The wi use made of this method is in reproc tion of colored pictures by means

half-tone process and the printing press. Half-tone blocks are made from the three-color negatives, and are printed in yellow, red, and blue inks, so that the three impressions coincide.

The Lippmann process, making use of the colors produced by *interference*, and Prof. R. W. Wood's process, based on *diffraction*, are only of scientific interest so far.

One of the most remarkable developments in modern photography is the *cinematograph* (MOVING PICTURES). and production of living pictures in natural colors by the *kinemacolor* process.

Among the numerous scientific applications of photography may be mentioned star-mapping and spectroscopic work in astronomy, X-rays in surgery, and the wide use of microphotographs in pathology and in the iron and steel industries. Several systems have been devised for the transmission of photographs by telegraph, the Korn system employing selenium, the electrical resistance of which varies with the intensity of the light falling on it, and the Thorne Baker system transferring directly without the necessity for development as in the Korn apparatus.

Military Photography.—In all wars since the introduction of photography, pictures associated with the campaigns have been numerous. But only a few authorized photographers accompanied the fighting forces, the bulk of the work being in the hands of civilians. In the World War this branch of work attained great importance, particularly in connection with the various Air Services. *Aerial photography* became one of the most important means of obtaining information regarding enemy forces and dispositions. As a result, one of the chief duties of the Air Services was the carrying of military photographers. Observations thus obtained enabled officers to study changes made from day to day in enemy dispositions. In this work the cameras were operated by hand until near the close of hostilities, when an automatic camera was devised.

In addition, *ground photography* was employed to a much greater extent than formerly. Its primary object was to produce historical records, including pictures for propaganda and educational purposes, in the form of still and motion pictures. To accomplish this work special photographic sections were formed in the various forces.

PHOTOGRAPHY, COLOR. See COLOR PHOTOGRAPHY.

PHOTOGRAVURE is an engraving process in which the action of light is utilized to produce plates from which copies or facsimiles of a photograph or drawing may be made. This process may be used for the reproductions of originals which may be either in 'tints' or in 'plain line'. When properly manipulated it results in prints which are rich in texture and quality, and it is thus particularly well adapted to the reproductions of paintings, old etchings, etc. Some of the best prints of to-day are made by this process. Briefly it is carried out as follows: A flat copper plate is coated with a mixture of a bichromate and either asphaltum or albumin, using a suitable solvent. This plate is then exposed to light under a black and white photographic positive of the picture to be reproduced. The action of light renders the coating insoluble in various solvents, to the action of one of which the plate is now exposed. The portions which were under the opaque parts or shadows of the original are thus removed. The plate is next etched with acid, the hardened parts acting as an etching ground or protection from the acid. It is then ready for the press.

PHOTOMETER. See PHOTOMETRY.

PHOTOMETRY deals with the measurement of the relative illuminating powers of different sources of light. The apparatus used is a *photometer*. The illuminating power of any source is the amount of light received by unit surface at unit distance from it. This varies inversely as the square of the distance, so that if the distance is doubled the light received by the same surface is one-fourth. A standard source must be fixed. The Brit. standard is a *sperm candle* burning 120 grains per hour and weighing six to the pound. For practical purposes, the *Harcourt lamp*, burning pentane and air, equal to 10 candles, is more manageable. The Fr. *Carcel lamp* burns 42 grammes of colza oil per hour; the Ger. and U.S. standard *Hefner-Alteneck* burns amyl-acetate and gives a reddish but very accurate light. The relation between these sources has been defined as Harcourt-1.02 Carcel-10.95 Hefner (Zurich Congress, 1907). As a final standard Violle proposed the light given out by a square centimetre surface of platinum at melting-point.

Since equal illuminations cannot be gauged directly by the eye, various devices are resorted to in photometers. Rumford's consists of a rod a short distance from a ground-glass screen. Two lights, one of known candle-power (*c.p.*), are moved till the shadows thrown by the rod are of equal darkness; then the powers of the two sources vary as the squares of their distances from the corresponding shadows, and the unknown light is determined. Bunsen's

is a simple and common form, consisting of a grease-spot on a screen of paper. When viewed from the same side as a light, the spot appears dark; from the opposite side it appears bright. The lights to be compared are moved on opposite sides of the screen till the spot becomes invisible from both sides, when the powers of the lights are proportional to the squares of their distances from the screen. In Lumner and Brodhun's photometer, by an optical arrangement two patches appear, showing a spot from one source inside a ring from the other. Equal illuminations are judged accurately either (1) when the two patches are uniformly bright, (2) the two spots are of equal darkness. Photometers in general give varying results with different observers, when the lights compared are not of the same tint. This difficulty is removed with the 'flicker' instrument, where the reflections from two lights are rapidly presented alternately, and equal illumination is achieved while the reflection becomes steady.

PHOTOSPHERE, name given to the sun's radiant surface, probably composed of incandescent clouds floating in a less luminous medium.

PHOTOSTAT, a machine for producing facsimiles of sketches, printed pages, manuscripts, etc. etc. The machine consists of a camera of the usual construction, with the necessary supports, and a support for the matter to be copied. A light-tight magazine is provided to hold the roll of sensitized paper used. This paper is fed to the camera mechanically, and after exposure it is automatically cut off, and carried to the developing, fixing and washing tanks. If small prints are required, a slide is used to cut off part of the field, and by setting an indicator on a scale the correct focus and position is secured, A special timing device can be used to govern the time of exposure and development. While daylight may be used for making exposures, artificial illumination, particularly mercury vapor lamps are in extensive use owing to the uniformity of results obtainable. Specially prepared sensitized paper is used for the process, which gives copies reversed in color, *i.e.*, the dark parts of the original are the whites of the photostatic copy and vice versa. If a positive copy is wanted, a negative is prepared and this is then photostated in the usual way, giving a positive. The original object is not reversed as in the ordinary negative, a system of prisms being used to reverse the image optically.

PHOTO-TELEGRAPHY. See TELEGRAPHY.

PHOTOTHERAPY. Radiant energ in the form of light and heat, is succe fully applied in the treatment of ma diseases. The term phototherapy, however, usually limited to the curati effects of sun, and electric ligh Roentgen or X-rays are referred to unc the name radiotherapy.

No adequate explanation of the the peutic effects of light has yet be offered, It is however known that actions of the various constituent r of a beam of white light differ; the bl violet and ultra violet portions of spectrum, so-called actinic rays, poss chemical actions which are lacking to red wave lengths. This fact has be utilized by Niles R. Finsen, a Cop hagen physician, who in 1895 develo an apparatus for utilizing light rays therapeutic purposes. Thus by expos smallpox patients to red light only, found that the disease was shorte and that suppuration was abolish The admixture of any actinic rays, as the admission of any daylight, irrita the skin, resulting in scars. These r have the power of producing an infla mation even in normal skins. bactericidal action of light is, howev limited to the actinic rays, which Nilsen's apparatus are concentrated quartz lenses, using an arc lamp source of light. As these rays found to penetrate more deeply wh the red blood has been pressed out of superficial vessels, a mechanism attached for compressing the surf exposed.

Phototherapy has been found especial value in cases of lupus, buncles, acne, rodent ulcers, neur thenia, tuberculosis, malnutrition, scu and rickets. In the last named disea the administration of cod liver oil effe definite cure. Recent experiments de onstrate that exposure of the patient sunlight for a few hours daily is equa effective. This and other recent w has proved the wisdom of the l standing custom of advising the expos of children and the sick to sunlight.

PHRAATES, five kings of Part who ruled between 175 B.C.—5 A.D

PHRENOLOGY, a pseudo-scie which infers from the shape of the and skull of any given person what his characteristics. It comes under domain of physiological psychology, as a worked-out system it is due firs to Gall, who began to publish writi on it in 1796.

Gall worked out in full detail the i of what are vulgarly called *bum* Other systems were worked out on si lar lines by a number of other think particularly Spurzheim, who postula

35 'bumps' (as against Gall's 26). Though these schemes have not generally won acceptance, they certainly resulted in a deeper study of the brain.

The physiological side of the question is a difficult one, for while anatomically the brain is fairly well understood now, physiologically much is still open to doubt. Though it seems probable that there is 'division of labor' in the brain, yet, if a portion be removed, its duties seem to be taken over by other parts of it.

Phrenology psychologically is also open to question, It is difficult to assume the existence of a number of different faculties which are as separate from each other as are the organs of the body, or else to assume a sort of common substance on which they all work. An attempt has been made to work out the principles of phrenology with recent research in psychology and physiology, but its validity is not always accepted by the best authorities.

PHRYGIA, large country in Asia Minor, which varied greatly in regard to boundaries at different periods of history, but generally speaking formed western part of central plateau region of peninsula; consisted principally of plateau region, most fertile district being valley of Sangarius, and most thickly populated part in S.W.; celebrated for marble, vines, and wool. Exact date of beginning of Phrygian monarchy is unknown; downfall of kingdom believed to have been in VII. cent. B.C., at time of Cimmerian Invasion; in VI. cent. B.C. Croesus conquered country, but was defeated by Cyrus *c.* 546 B.C., and P. passed into hands of Persians; invaded in III. cent. by Gauls, who took possession of E. part of country and called it Galatia; country given by Alexander the Great to Antigones, and kept by him till his death. P. had important influence on Gk. art and culture. Chief deities were Cybele the Mother and Sabazias the Son (Gk. Dionysus). P. was early Christianised.

PHRYNÉ (*c.* 340 B.C.), a celebrated courtesan of ancient Athens; was the *dau.* of Epicles, and was *b.* at Thespiae, in Boeotia. Hyperides the orator, Apelles the painter, and Praxiteles the sculptor, were among her lovers. She served as model for the 'Venus Anadyomene' of Apelles. and the 'Cnidian Venus' of Praxiteles.

PHRYNICHUS, the name of three Gk. writers. The first, a tragic poet, flourished about 560 B.C.; the second, a poet of Attic comedy, and abused by Aristophanes; the third, a grammarian of the time of Marcus Aurelius.

PHTHALIC ACID, the orthovariety of the three isomeric acids, having the formula $C_6H_4(COOH)_2$. It is obtained by the oxidation of naphthalene by means of fuming sulphuric acid and mercury, and forms colorless crystals (sp. gr. 1·6; m. p. 213° C.) that are soluble in water. It yields an anhydride when heated, and is the parent substance of phthalein dye-stuffs.

PHTHIOTIS, dept. of Greece, S.E. of Thessaly (*q.v.*), and home of Achilles (*q.v.*). Pop. 113,000.

PHTHISIS, condition due to tuberculosis of the lungs. See TUBERCULOSIS.

PHYLE (37° 10′ N., 23° 40′ E.), fortress of Attica, on borders of Boeotia; taken by Thrasybulus and the Athenian patriots, 404 B.C.

PHYLLITE, group of schistose clay-rocks containing quartz, mica, chlorite, and muscovite; composed of metamorphosed argillaceous matter.

PHYLLOPODA. See CRUSTACEA.

PHYLLOXERA, OR VINE INSECT, a genus of minute insects (family Aphidae, order Hemiptera) which do enormous damage to vines. The life-history is very complicated, the females living on the vine roots and laying each 30 to 40 unfertilized eggs from which in a week the fresh brood hatches. So many generations succeed each other in a season that, barring accidents, the progeny of a single individual would in a year number more than 20 millions. In spring the leaves are attacked by newly hatched insects and great harm is done. In vineries the stems of roots are scraped in winter to destroy any *Phylloxera* eggs that may lurk in the crevices of the bark.

PHYSICAL CHEMISTRY. The division between physics and chemistry is a very narrow one. In fact, the more profoundly the sciences are studied, the more are they found to converge. There are many phenomena involved in modern chemical reactions of a definitely physical character, and towards the end of the nineteenth century it came to be recognised that a new branch of science had come into existence, which was neither pure physics nor pure chemistry, but occupied an intermediate position. To this science was given the name Physical Chemistry. The science is a study of the nature of chemical processes and of the laws which govern them. It deals with the properties of gases, and their behavior under varying conditions of pressure and temperature. It studies phenomena of solution, and the properties of liquids, their vapor pressures,

boiling points, specific heats, refractive powers. It studies crystal formations and seeks the relation between chemical composition and crystallographic form. Two important branches of physical chemistry are thermochemistry and electrochemistry. All chemical reactions are accompanied by changes in temperature, and thermo-chemistry measures the heat evolved or absorbed and endeavors to discover the laws underlying such changes. Electrochemistry studies the changes brought about by the passage of electric currents through solutions, with all the attendant phenomena involved. Photochemistry (*q.v.*) also comes within the scope of the physical chemist, while the laws of mass action, chemical dynamics and chemical equilibrium form an important contribution to the parent science. Physical chemistry has thrown much light on many chemical phenomena not understood hitherto, and some knowledge of its most important findings is essential to every chemist regardless of the particular branch in which he has specialised.

PHYSICAL EDUCATION, the training of the functions of the various parts of the body. It is to be sharply distinguished from the old fashioned physical training, which had as its chief object the development of muscle. The undisputed fact that most athletes experience physical deterioration prematurely has brought about a realization that mere muscular development in itself is not an end desirable in itself. Physical education seeks rather a uniform development, not only of the muscles, but of all the organs of the body, and above all co-ordination between different sets of muscles and between the muscles and the brain. It includes a recognition of the importance of manual training, even for students who are preparing themselves for the professions, the co-ordination of the muscles of the hands and the brain being thus developed. The value of boxing as a medium for physical education is also more recognized than formerly, not only because it develops agility and brings into play so many different sets of muscles of the body, but because of the mental concentration demanded by the exercise. Fencing has an almost equal value, for the same reason. The modern physical instructor desires to develop massive muscular strength not so much as co-ordination between the various groups of muscles, and between the muscles and the brain.

PHYSICAL GEOGRAPHY. See GEOGRAPHY.

PHYSICS, term formerly applied to natural philosophy or the science of the phenomena of nature, but which today is more restricted in its scope and may be defined as the science of energy. Formerly chemistry, astronomy, geology and many other sciences were regarded as forming a part of physics, but as these have become more specialized they have formed distinct sciences of their own. There is no rigid line of demarcation, however, and the close relations between them are still emphasized by such terms as physical chemistry, meteorological physics, etc. The development of modern physics is more fully described under the separate headings of its various subjects, such as sound, heat, light, electricity and magnetism. Prior to the 19th century, the only principles of physics which were firmly established were the law of gravitation, the principle of the conservation of matter and the conservation of momentum. The 19th century has seen the development of the principle of the conservation of energy and its application to all fields of science. Modern physics is an inductive science, based upon the belief that the same causes operating under the same conditions will always result in the same effects. A study of many similar or related phenomena suggests a generalization or hypothesis as the explanation of them all. This hypothesis, as it is more fully tested and perfected, becomes a theory, and when time and experiment have established that all known phenomena are still in harmony with it, it rises to the dignity of a physical law. The doctrine of the conservation of energy, in the view of modern physics, is the basic law connecting all physical phenomena. Among the more notable achievements of physics in recent times have been the discovery of X-rays by Roentgen, the radiation from uranium, the development of the idea of the luminiferous ether, the vacuum tube, telegraph, telephone, incandescent lamp, liquefaction of air and other gases and the demonstration of the amazing activities of radium.

PHYSIOCRATIC SCHOOL, founded by Francis Quesnay 1694-1774; included Turgot, Gournay, Mirabeau, Morellet; doctrines preponderant under Louis XVI., and in Revolution; held that the earth is the only source of natural wealth,

PHYSIOGNOMY, the theory and art of discerning mental character from bodily appearance. The earliest monograph on the subject is that wrongly attributed to Aristotle, which discusses (1) the signs of character in general, (2) the physiognomy of the sexes, and (3) the comparison of human and animal appearance. In the Middle Ages the

study became implicated with cheiromancy and magic. Many treatises on it appeared in the XVI. cent., that of della Porta being the chief. In the XVII. cent. John Evelyn and John Bulwer treated of it in this country. By far the best-known XVIII.-cent. writer on it is Lavater, the later editions of whose works are admirably illustrated. Lavater tried to bring the subject into relation to the fine arts. More recent writers, *e.g.* Sir Charles Bell and Darwin, have discussed the subject from a more scientific standpoint.

PHYSIOGRAPHY, name given by Huxley to the systematic description and scientific discussion of the general properties of our earth and atmosphere. Practically synonymous with physical geography. See GEOGRAPHY.

PHYSIOLOGUS, name of a collection of animal stories widely read and circulated in the Middle Ages, originally written in Greek, and now existing in various forms in Lat., Syriac, Armenian, Arabic, Ethiopic, Old Eng., Old Fr., Old High Ger., Provencal, and Icelandic versions. It is sometimes called the *Bestiary*, as it contains stories of animals with morals appended. These were probably chiefly taken from scriptural commentaries, particularly on Genesis.

PHYSIOLOGY, the science which deals with the functions of living organisms, as distinguished from anatomy, which deals with their structure. Human physiology may be considered under the headings of *nutrition*, including the processes concerned with the digestion of food and its assimilation and absorption into the blood and thence to the tissues, the absorption of oxygen from the air by the blood through the agency of the lungs and its conveyance to the tissues, the circulation of the blood and of the lymyh, with the excretion of waste matters by the bowel, kidneys, lungs, and skin; *growth* of the body, brought about by the continued division of the cells composing the tissues; and *reproduction*, which is a specialized form of growth in which there is increase of living substance formed by cell division in such a way that a new individual is set free; *nervous activity*, comprising the functions of the brain, which is the seat of consciousness, the spinal cord, sympathetic system, sense-organs, and nerves; *movement*, which is carried out by the muscles in relation with their supporting structure, the skeleton.

History.—Until the 15th cent. speculation and discussion held sway, the outstanding names being Hippocrates and Galen, the dogmatic teaching of the latter dominating the science. With the fall of Constantinople (A.D. 1453) and the diffusion of the Gr. scholars through W. Europe, the writings of Hippocrates and Galen became known in the originals and to their influence was due the revival of interest in anatomy and physiology. Paracelsus, in the 15th cent., promulgated theories of life independent of Galen, but his influence was fleeting.

The study of anatomy was revived in Italy in the 16th cent. by Vesalius, who dissected the human body and opposed the physiological theories of Galen; he was followed by Fabricius, and, at the beginning of the 17th cent., William Harvey, who had studied under the Ital. anatomists, made the epoch-making discovery of the circulation of the blood, 1628. About this period arose the Iatromechanical school, of which Borelli and Pitcairne were the most notable members, and the Iatro-chemical school, founded by the Dutchman Sylvius, one of his most eminent followers being Willis, who made valuable researches in regard to the secretions. Both of these schools attempted, on opposing lines, to explain the phenomena of life in accordance with scientific facts. The invention and improvement of the microscope in the 17th cent. stimulated research, Leeuwenhoek and Malpighi especially making valuable discoveries with its aid, the science of Histology being founded by them.

Von Haller, in addition to making various discoveries of greater or less importance, particularly in regard to muscular irritability, co-ordinated the different parts of the science, and gave it a definite form. Johannes Müller, in the first half of the 19th cent., labored in the same direction, and showed, among other things, that different forms of stimuli produce the same effect upon a particular organ. Von Baer made valuable researches regarding the development of animal life, and may be regarded as the founder of the science of embryology; Cuvier linked palaeontology with comparative anatomy, and was the first to realize the inter-dependence of the organs and parts of an organism; Lamarck foreshadowed the theory of natural selection, and promulgated an important, but still debated, theory of evolution; Schleiden and Schwann showed that all organisms are built up of cells, while von Mohl and du Jardin discovered that protoplasm is the essential constituent of the cells.

Among noteworthy stages in the progress of the science are the discovery of the law of the conservation of energy by Mayer and Helmholtz and its application to the living organism, the researches regarding the nervous system by Marshall Hall, who discovered the

laws of reflex action, and of Weber, who discovered the laws of inhibitory nerve action, and the widespread investigations of Claude Bernard, among whose discoveries may be noted the saccharine function of the liver and its connection with the nervous system. Charles Darwin added to the primary ideas of evolution of Erasmus Darwin and Lamarck the theory of natural selection, and made possible an explanation of the structure and evolution of living things, and harmonized all the branches of science.

Physiology has made extraordinary advances in recent years. Among these is an increased knowledge of the localization of brain functions largely due to the work of Horsley, Jackson, and Ferrier, and the nerve control of the body studied by Sherrington. New methods of studying the circulation have been introduced. Notable advances have been the introduction of the sphygmomanometer, by which the blood pressure of a man can be conveniently and easily ascertained, and the electrocardiograph, by which the electrical current set up by the action of the heart can be really recorded. But perhaps the outstanding discoveries of recent times have been in the field of chemical physiology. It has been found that the respiration and many of the other body functions are controlled by the amount of carbon dioxide in the circulating blood. A new page has been opened by the discovery of the internal secretions which are passed directly into the blood stream by certain 'ductless glands' and profoundly affect the nutrition of the body. Still more recent is the discovery of 'accessory food factors' or Vitamines, substances present in articles of diet which the body cannot do without. Scurvy and beri beri are now known to be deficiency diseases due to the absence of certain 'vitamines' from the food. The part played by the body fluids in protecting the body against micro-organismal disease is now a huge field of study, embracing both physiology and pathology.

PIACENZA (45° 3′ N.; 9° 40′ E.), town, near Po, northern Italy; capital of province P.; with cathedral, 1122, Sant' Antonia; San Sisto, 1499, formerly possessed Raphael's Sistine Madonna; communal palace, Farnesi and other palaces; Museo Civico, etc.; founded by Romans as *Placentia*, 219 B.C.; a leading town of the Lombard League in Middle Ages; united to Parma, 1545-1860, engaged in silk industry; Pop. 41,000.

PIA MATER. See BRAIN.

PIANO, or **PIANOFORTE**, a familiar keyboard musical instrument, evolved from its immediate predecessors, the *clavichord* and the *harpsichord*, of which latter the *spinet* was a variety. The fundamental difference between the Pianoforte and the instruments named lies in the mechanism of the tone production. In the clavichord, the earliest mention of which occurs in a work of 1404, the tone was produced against the strings; in the harpsichord, by quills or strips of leather (technically called 'jacks') plucking the strings. In the Pianoforte, the tone is produced by hammers striking the strings and rebounding immediately afterwards. The latter (technically the 'check' action) is an essential condition; for if the hammer were to remain in contact with the string for the minutest fraction of a second, the contact would deaden the vibration and practically stop the sound. The tone of the clavichord was weak and metallic; that of the harpsichord was louder, but hard and inflexible. Both instruments had the crowing defect implied in the fact that the tone could not be varied, as to loud or soft, by the player's impact of the key. It was precisely because this was at last attained in the pinaoforte that the new instrument was so named; that is to say, it could play *piano* (soft) or *forte* (loud), with ranges of power between these extremes. At first it was called indifferently 'pianoforte' or 'fortepiano.'

The inventor was a Florentine named Bartolommeo Christofori, 1651-1731, his hammer action, essentially that of today, being announced and described in 1711. Other claims to independent discovery have been made. Harpsichords continued to be made till the beginning of the 19th cent.; and it is significant that up to 1799 the title-pages of Beethoven's sonatas bore the words, 'for the pianoforte or harpsichord.' Curiously enough, it was not until 1767 that the first recorded performance on a pianoforte took place in England. In the last quarter of 18th cent., the new instrument was more and more gaining supremacy over its predecessors. Once fairly established, its development towards perfection was rapid.

The most natural form of the pianoforte is that known as the *Grand*, in which the strings are placed in a horizontal position parallel with the keyboard. This form, the same as that of the harpsichord, was probably suggested by the varying length of the strings. Grand pianos are of three kinds—the concert grand, the semi-grand or drawing-room grand, amd the boudoir grand, these names denoting the length. In the more familiar *cottage* or urpight piano, the strings are stretched vertically over the

sound-board from top to bottom of the instrument. The different forms involve certain differences in the mechanism, but the essentials are in all cases the same. The hammer action has already been mentioned. What is known as the *damper* action is necessary for checking the continuance of the sound when the finger has left the key. It consists of a piece of leather or felt, elevated upon a vertical wire connected with the back of the key. When the key is struck, this mechanism, which otherwise rests upon or presses against the strings, is immediately removed therefrom, so that the tone may be clear and unimpeded; when the key is quitted, the 'damper' instantly springs back and stops the vibration of the wires. Intimately connected with this action is the so-called *loud pedal*, which, on being pressed down by the foot, virtually deprives the instrument of its dampers, so that the sound runs on without check so long as the vibrations last. The *soft pedal* is a contrivance which shifts the hammers slightly to the side so that one string fewer is struck, or which interposes a strip of cloth or felt and shortens the length of stroke of the hammers, thus producing less tone. The number of strings to each key varies in different instruments. In the grand pianoforte there is usually one string to the lowest octave, two strings to the succeeding lower notes, and three to the middle and upper notes. The first pianofortes had a compass of about five octaves, thus corresponding to the harpsichord. Gradually this has been extended, until the instrument has now a range of seven octaves.

Practically all the really great composers, Wagner excepted, have made important contributions to music for the pianoforte. Beethoven, especially in his sonatas, was the first great classic of the piano. Schubert, Schumann, Mendelssohn, Brahms, and Liszt made each his peculiarly characteristic addition to the growing literature. In Chopin the pianoforte found its most poetic exponent.

PIANO PLAYERS, MECHANICAL.—The familiar street or handle piano has a mechanism of very simple construction. Inside the instrument is a metal barrel, on the surface of which are little projecting pins. When the handle is turned this barrel revolves, and each pin depresses a crank, which makes the connected hammer strike a blow on the strings; a spring causes the hammer to resume its original position as soon as the pin leaves the cranks.

The first method of playing an ordinary piano by mechanical means seems to have been invented by Debain of Paris about fifty years ago. According to his method, pinned boards termed 'planchettes' were used instead of the pinned barrels of street instruments, and, as a handle was turned, these called into action an extra set of hammers inside the piano. The apparatus formed a part of the instrument in which it was used, and could be introduced into organs and harmoniums as well as into pinaos. In recent years this method has been almost entirely superseded by a system of mechanism controlled by pneumatic action. The mechanism was formally enclosed in a portable cabinet case, which was placed in front of the keyboard of the piano when in use, but is now usually enclosed within the piano case itself. A row of levers, termed fingers, projects from the instruments; these terminate in the form of little hammers, have their striking surfaces covered with soft leather, and rest upon the keys of the piano when not in action. In the upper part of the instrument there is a tracker-board containing longitudinal slots, and underneath each slot is a pneumatic tube, which leads to and controls the action of the finger thus connected with the slot. The musical notation of the composition which the instrument performs is represented by perforations made in a scroll of tough, strong paper wound upon a spool. When the instrument is brought into use, a scroll is placed in a spool-holder situated behind the tracker-board; the free end of the scroll is then brought over the board and affixed to a roller in front of it. This roller being lower in position than the tracker-board, the paper is brought into close contact with its slotted upper surface. As the beginning of the scroll is unperforated, no air at this stage can pass through the slots. The instrument is furnished with several little bellows worked by pedals, as in playing the harmonium; these by suction action exhaust all air from the slots and tubes leading to the fingers; they also set in motion a motor, which causes the roller in front of the tracker-board to revolve. As the scroll is unwound each perforation in crossing a slot admits a rush of air which causes the finger in connection with it to strike its note on the keyboard of the piano. The scroll indicates the correct degree of *tempo* to be used, and contains signs which indicate the degrees of *nuances* to be observed. The desired effects are obtained by pressing a knob, which regulates the quantity of air admitted to the slots. Another knob, when depressed, acts upon the loud pedal of the piano, so that a *fortissimo* can be produced at will. The intruments, besides playing solos, can also be used to accompany songs, violin solos, etc. Some piano-

players have a finger for each note on the keyboard of a piano of full compass, but the majority contain only sixty-five fingers, the first of which plays the second lowest A and the last the highest C sharp on the piano.

PIANOSA, ancient *Planasia* (42° 35′ N., 10° 3′ E.), island, Italy; off W. coast.

PIASTRE (Lat. *emplastron*, a plaster, hence anything flattened; It. *piastra*, a coin), an old Spanish silver coin, worth about a dollar, called a *piece of eight*, being divided into eight silver reals.

PIATRA (46° 56′ N., 26° 20′ E.), town, on Bistritza, Moldavia, Rumania; trade in timber. Pop. 18,500.

PIATT, JOHN JAMES (1835-1917), an American poet, *b.* in James' Mill, Dearborn co., Ind. After graduating from Capitol University, in Columbus, Ohio, he was a clerk in the U. S. Treasury Department, later librarian of the House of Representatives and during 1882-93 U. S. Consul at Cork, Ireland. During his later years he did newspaper work. Among the collections of his verse published are *The Nests of Washington*, 1864; *A Book of Gold*, 1889 and *The Ghost's Entry and Other Poems*, 1895.

PIAUHY (7° 30′ S., 43° W.), maritime state, Brazil, drained by Parnahyba; cattle-rearing; capital, Therezina. Pop. 1920, 584,250.

PIAVE, riv. rising in dist. of Cadore, Treviso, N. Italy (45° 50′ N., 12° E.). Below Belluno it runs S.W. through the last foothills of the Alps, and becomes a considerable stream, dwindling much in volume during the dry season. After passing Nervesa it makes a wide bend eastward, and thence flows to Porto di Cortellazo on the Adriatic through plain country. Between St. Dona and the sea it runs through marshy meadows intersected by canals which merge into the meres and lagoons of the coast. Length, 125 m.; area of basin, 1,583 sq. m. Navigable from entrance into prov. of Venice; above that used for floating timber. After the disaster at Caporetto (Oct. 24, 1917) the 3rd Ital. Army and the remnants of the 2nd retreated to the line of the Tagliamento; but on Nov. 7, when the Austrians crossed the Livenza, the whole line fell back on the Piave, where it maintained itself, despite all the efforts of the enemy, to turn the position, until the Austrians began their retreat on June 22, 1918. The Allied advance, which began on Oct. 27, was followed by the request for an armistice, Nov. 1. See WORLD WAR.

PIAZZO ARMERINA (37° 22′ N., 14° 22′ E.), city, Caltanisetta, Sicily; bp.'s see; woolens. Pop. 25,000.

PICA, a magpie; See under CROW FAMILY.

PICARD, LOUIS BENOIT (1769-1328), a French dramatist, *b.* at Paris. His first success on the stage was *Le Badinage Dangereux*, which was followed by *Le Mari Ambitieux*, *Les Amis de College*, *La Petite Ville*, *Les Marionettes*, etc. P. was also successful as a novelist, his chief productions of this class being *L'Honnete Homme* and *Gil Blas de la Revolution*.

PICARDY, old province in N. of France, now comprising departments of Somme and portion of Pas-de-Calais, Aisne, and Oise; contained many important towns, including Amiens and Boulogne, and battlefields of Agincourt, Crecy, and St. Quentin.

PICARESQUE NOVEL, THE (Span. *picaro*, *picaroon*, 'rogue', type of story common in W. Europe from middle of XVI. to end of XVIII. cent. The p. n. emanated from Spain; first known story *La Vida de Lazarillo de Tormes*. From Spain, p. n. penetrated to Holland, where it enjoyed a limited popularity and formed, as in other countries, theme of many plays; thence to England, where Nash's *Unfortunate Traveller* was followed by Defoe's *Moll Flanders* and Fielding's *Jonathan Wild*. France adopted the idea enthusiastically; *Gil Blas*, *Barbier de Seville*, and *Mariage de Figaro* good though late examples.

PICCINNI, NICCOLA (1728-1800, Ital. opera composer; Gluck's famous rival at Paris; wrote *La Cecchina*, *Roland*, etc.

PICCOLOMINI, OTTAVIO, PRINCE (1599-1656), Austrian commander; distinguished in Thirty Years War; made famous attack on Gustavus Adolphus at Lutzen, 1632; helped to win day at Nordlingen, 1634; defended Austria against Swedes, 1640 and 1648.

PICENUM, former district, Italy; bordering on Adriatic; came under Rom. control about 270 B.C.; rebelled, 90 B.C., when Social War broke out.

PICHEGRU, CHARLES (1761-1804); distinguished general of Fr. Revolution; commander-in-chief of army of Rhine, 1793, and captured imperial fortresses; overran Holland, 1795; plotted with Bourbons and frequently fell under suspicion; great conspiracy for assassination of Napoleon, 1804; betrayed; either murdered or committed suicide.

PICHON, STEPHAN JEAN MARIE (1857), Fr. statesman; *b.* Armaq-le-Duc,

and educated at Paris; in 1893 was defeated, and abandoned active politics; then served his country as minister in Haiti, Brazil, 1895; and Peking, 1897; where his period of office coincided with the Boxer rebellion, in which he showed great coolness and courage, and at its settlement obtained important railway concessions for France; was resident-general at Tunis, 1901, minister for foreign affairs in the Clemenceau cabinet, 1906-9, and in the cabinets of Briand, 1910-11, Barthou, 1913; and Clemenceau, 1917; one of the Fr. representatives at the Peace Conference of Paris, 1919.

PICKENS, ANDREW (1739-1817), an American soldier, *b.* in Paxton, Pa. Entering the service of the British Army as a youth, he fought in the Cherokee War, in 1761, and at the outbreak of the Revolution joined the Continental Army with the rank of brigadier-general. He defeated the British forces under General Boyd at Kettle Creek, in 1779, led the attack against the forts at Augusta, Ga., and compelled their surrender. During 1813-5 he served in Congress.

PICKENS, FORT, one of the defenses of Pensacola Bay, situated on Santa Rosa Island, at the mouth of the harbor. At the outbreak of the Civil War it was practically ungarrisoned. In January, 1861, Lieut. A. J. Slemmer, in command of the small garrison distributed among the three forts defending the Bay, brought together all his men, numbering 81, and prepared to defend himself in Fort Pickens. He succeeded in holding the fort against the various efforts made to compel him to surrender, until April, when reinforcements were sent. In October there was a more serious attempt on the part of the Confederates to take the fort, forces being landed there to engage in the operations. These assaults were successfully repelled, however, and the Federal flag continued flying over Fort Pickens during the entire period of the war.

PICKEREL, name for small Pike.

PICKERING, EDWARD CHARLES (1846-1919), Amer. astronomer and physicist; *b.* Boston; invented meridian photometer, an instrument for classifying magnitude of the stars.

PICKERING, TIMOTHY (1745-1829) Amer. general and statesman; commanded in War of Independence, and held offices under Washington's administration. Sons, John 1777-1846, philologist, and Octavius, 1792-1868, who prepared State *Reports*, grandson Charles 1805-78, naturalist, and great-grandson, Edward Charles, *b.* 1846, astronomer, are all well-known men.

PICKERING, WILLIAM HENRY (1858), an American astronomer. *b.* at Boston, *s.* of Edward and Charlotte Hammond Pickering. He was educated at the Mass. Inst. Tech. and afterwards was an instr. there and asst. prof. at Harvard Obs. He traveled extensively and made several discoveries in the interests of astronomy and established and erected a number of observatories. He was also interested in mountain climbing, ascending over 100 peaks, and was the author of numerous books on astronomy, etc.

PICKET, a small body of men posted beyond the general line of sentries for purposes of observation, and to give warning of attack.

PICKETT, GEORGE EDWARD (1825-1875), a Confederate soldier, *b.* in Richmond, Va. He graduated from the West Point Military Academy, in 1846, served throughout the Mexican War and did frontier duty in Washington. At the outbreak of the Civil War he resigned and joined the Confederacy with the rank of major-general. At the Battle of Fredericksburg it was his division which held Lee's center, and at Gettysburg he led the famous assault on Cemetery Ridge, known as 'Pickett's Charge.'

PICKFORD, MARY, (MRS. DOUGLAS FAIRBANKS) (1893), an American actress, *b.* at Toronto, Can. (family name Smith). She was divorced from her first husband, Owen Moore, an actor, in 1920, and married Douglas Fairbanks in the same year. She made her debut on the stage at the age of 5, however her first marked success was in motion pictures, in *Hearts Adrift*, and although she returned to the stage for a short time, she later acted for motion pictures exclusively and was a leading woman in numerous successes, through which she gained international fame, finally becoming the head of her own company at Hollywood, California.

PICKLES, a term applied generally to vegetables preserved in vinegar. The vegetables most commonly pickled for a condiment are cauliflowers, cabbages, young cucumbers, walnuts, nasturtium seeds, French beans, onions, olives, capers, and mangoes, which are soaked or boiled in salt brine, acetic acid, vinegar, or unmalted barley, with or without spices.

PICO (38° 20′ N., 28° 30′ W.), volcanic island of the Azores, rising to height of 7,612 ft. Chief town, Lagens, Pop. 25,000.

PICO DELLA MIRANDOLA, GIOVANNI, COUNT (1463-94), Ital. philosopher; member of Academy, Florence; sought to reconcile Plato with Aristotle, religion with philosophy; later, a mystic.

PICQUART, GEORGES (1854-1913), Fr. soldier; *b.* Strasbourg; joined the War Office staff, 1883; became chief of the intelligence department, 1895, but was forced to resign in the following year, on stating his conviction that the 'bordereau' in the notorious Dreyfus case was the work of Esterhazy, not of Dreyfus; for his evidence in the Esterhazy trial, 1898 he was imprisoned, and afterwards dismissed from the army for the evidence he gave in the Zola trial; reinstated with the rank of general, and decorated with the Legion of Honor on the declaration of Dreyfus's innocence, 1906; subsequently held portfolio of minister of war; was author of *Projets de Loi relatif a la Constitution des Cadres et des Effectifs des Armees active et territoriale*, 1908.

PICRIC ACID $C_6H_2(NO_2)_3OH$. Trinitrophenol. Also known as yellow gall, bitter yellow or chrysolepinic acid. A bright yellow, crystalline organic compound, prepared by the action of nitric and sulphuric acids on phenol. It is the oldest of the artificial dyestuffs, having been prepared in 1771 by Woulfe. He treated indigo with strong nitric acid, thereby obtaining a yellow dye, which was afterwards analysed by Liebig who gave it the name carbazotic acid. Dumas investigated it further,and named it picric acid. It is used to some extent as a dye, but because it is fugitive to both light and washing, its use is much less than in former years. It has been used in tanning, but its greatest importance is as a constituent of explosives. Compounds of picric acids are used in percussion caps.

PICRITE, rock well; contains abundant olivine and also augite and plagioclase.

PICROTOXIN, neutral principle, consisting of colorless glistening prisms of a bitter taste, obtained from the fruit of an Indian plant called the Indian berry (*Anaminta paniculata*); a powerful poison, used medicinally.

PICTON, SIR THOMAS (1758-1815), Brit. general; distinguished in W. Indies, 1794-97, and app. gov. of Trinidad; commanded under Wellington in Peninsular War, and won fame at sieges of *Ciudad Rodrigo* and *Badajoz*, 1812, *Vittoria*, etc., 1813-14; slain at *Waterloo*.

PICTOU (45° 42′ N., 62° 45′ W.), seaport, Nova Scotia; exports coal. Pop. 3,400.

PICTS. See SCOTLAND (HISTORY).

PIDGIN, CHARLES FELTON (1844-1923), an American statistician and author; *b.* in Roxbury, Mass. He taught school for several years and was afterwards engaged in business. He then entered journalism and was connected with papers in Boston, Philadelphia and New York. In 1873 he was appointed secretary of the Massachusetts Bureau of Statistics of Labor, and was later commissioned chief of the bureau. In addition to his work in this capacity he wrote many songs and librettos, and several novels, the best known of which is *Quincy Adam Sawyer*.

PIEDMONT (45° N., 8° E.), division of Italy, partly surrounded by Alps and Apennines, consisting of four provinces Navara, Cuneo, Alessandria, Turin; area, 11,336 sq. miles; long under house of Savoy (*q.v.*). Pop. 3,508,700.

PIENZA (43° 5′ N., 11° 40′ E.) town, Siena, Italy; cathedral; birthplace Pope Pius II.

PIER, name given to solid support of masonry or brick which carries an arch or other similar superstructure or to mole or jetty used to shelter a harbor or to form landing-stage or seaside promenade. P's are largely used in the construction of bridges and viaducts, their form depending upon the weight to be supported and the nature of the ground.

PIER, ARTHUR STANWOOD (1874), author; *b.* at Pittsburgh, Pa. In 1895, graduated from Harvard College. Author of: *The Pedagogues*, 1899; *The Sentimentalists*, 1901; *The Triumph*, 1903; *Boys of St. Timothy's*, 1904; *Ancient Grudge*, 1905; *Harding of St. Timothy's*, 1906; *The Young in Heart*, 1907; *The New Boy*, 1908; *The Crashaw Brothers*, 1910; *The Jester of St. Timothy's*, 1911; *Story of Harvard*, 1913; *The Women We Marry*, 1914; *Grannis of the Fifth*, 1914; *Jerry*, 1917; *The Plattsburgers*, 1917; *The Son Decides*, 1918; *Dormitory Days*, 1919; *The Hilltop Troop*, 1919; since 1918 editor of the Harvard Graduates' Magazine.

PIERCE (OR PEIRCE), BENJAMIN (1809-80), an American mathematician and astronomer. He studied under Dr. Bowditch, author of *The Practical Navigator*. P.'s researches gradually made him known outside his own university, and honors came to him from different parts of the world.

As superintendent of the United States Coast Survey, P. was able to put his scientific knowledge to an immediate practical use for the benefit of his country. His astronomical learning was much in advance of that of contem-

porary scientists in America, where the position held by P. was for a while unique.

PIERCE, FRANKLIN (1804-69), fourteenth president of E. S.; distinguished in Mexican War, 1846-7; president 1853-7; supported slavery and the Fugitive Slave Law; settled Mexian boundary dispute; arranged ten years' reciprocity with Canada; supported Ostend manifesto; reorganized consular and diplomatic service; established U. S. court of claims; completed surveys for Pacific Railway; sided with the Union, 1861.

PIERPONT, JOHN (1785-1866), an American poet, *b.* in Litchfield, Conn. He graduated from Yale University, in 1804, studied theology and was pastor of the Hollis St. Church in Boston, from which position he was later dismissed on account of his pronounced views against slavery and alcoholism. His verse was collected in *Airs of Palestine and Other Poems*, 1840 and *Anti-Slavery Poems*, 1843. His *Warren's Address at the Battle of Bunker Hill* became very popular.

PIERRE, a city of South Dakota, the capital of the State and the county seat of Hughes co. It is on the Chicago and Northwestern Railroad, and on the Missouri River. It is the center of an extensive stock raising and agricultural community. The public buildings include a State Library, State Capitol, Federal building, and a government school for Indians, and also several hospitals. Pop. about 5,000.

PIERREFONDS (49° 40′ N., 2° 55′ E.), town, Oise, France; celebrated feudal chateau.

PIERREPONT, EDWARD (1817-92), an American lawyer and diplomat, *b.* in New Haven, Conn. He graduated from Yale University, in 1837, studied law and practiced, first in Cincinnati, Ohio, then in New York. He was judge of the New York Supreme Court during 1847-60 and was one of the prosecuting attorneys against John H. Surratt, an accomplice in Lincoln's assassination. During 1875-6 he was Attorney-General, then Minister to England for two years.

PIERS PLOWMAN. See LANGLAND.

PIETERMARITZBURG, 'MARITZBURG (29° 46′ S., 30° 13′ E.), capital of Natal Province, formerly of Natal Colony; 41 miles from coast, 2220 ft. above sea-level; government buildings, town hall, Univ. Coll.; bp.'s seat. Pop. 1921, 35,077 (17,472 white).

PIETISM, a religious development in Lutheranism in the XVII. and XVIII. cent's. The Lutheran Church had a rigid and rather formal system, with too much emphasis on externals and dogmatic standard, and not enough on simple piety or the Bible. One of the leaders was Philip Jacob Spener, 1635-1705. Pietism had most influence in N. and Central Germany, but about 1750, was on the wane.

PIGEON-POST, the employment of trained pigeons to carry news; in use amongst the Greeks; still in use for military purposes in continental fortresses; carried out with remarkable success at siege of Paris, 1870-71.

PIG FAMILY (*Suidae*), a family of even-toed ungulate mammals, including forty species found only in the Old World; forms with peccaries and hippopotami a group Suina, a division of Artiodactyla. They possess in common a long, cylindrical, mobile snout, with the nostrils on its flat disk-like extremity; narrow, four-toed feet, only the two central ones touching the ground; canines of upper jaw curving upwards and outwards to form tusks. The true pigs (*Sus*) are found in Europe, Asia, and Africa, inhabiting bush country and devouring vegetable or animal food almost indifferently, though they show preference for roots. They are, as a rule, exceedingly fierce in the wild state, and form adversaries by no means to be despised.

The common wild boar (*S. scrofa*), which persisted in England till the Middle Ages, is the probable originator of Brit. domestic pigs, of which there are many varieties derived from the old races of tall, bristly 'old English hogs,' or small, brownish Scot. Highland hogs, by crossing chiefly with Chin. stocks to give 'white breeds,' and Neapolitan to give 'black breeds,' Domestic pigs are known also as hogs, or swine; the male is a boar, the female a sow. The bush pigs, or river hogs (*Potamochoerus*), frequent the banis of rivers and lakes in Africa and Madagascar, while the babirusa and wart hogs (*Phacochoerus*) are confined to the Malay Archipelago and Africa respectively.

PIGEON FAMILY, COLUMBIDÆ.—The true Pigeons, found in most parts of the globe, include the swiftly flying Common Wood P. (*Columba palumbus*), the Rock P. (*C. livia*), the wild form of the Domestic P. inhabiting the cliffs and foreshores, and the smaller Stock Dove (*C. oenas*). The Carrier P. is one of the most useful of the many domestic varieties, serving as message-bearer in times of war and peace.

PIG IRON, the result of the smelting operations to which iron ore is subjected after being mined; iron in the first stage

of manufacture. After having been melted in blast furnaces, the iron is cast into bars, or 'pigs,' and constitutes the raw material out of which all iron and steel goods are to be manufactured. The production of pig iron has a special economic significance in all industrial countries, as the production of wheat has in an agricultural country, forming a medium of measurement of the country's prosperity, while its price forms a basis for estimates of the cost of living. In 1870 the United States produced 1,665,000 tons of pig iron, as compared to 6,061 produced by Great Britain. In 1917 the production in this country was 38,647,000 tons, compared to 9,752,000 produced in Great Britain. As very little pig iron is ever imported or exported, most of it being manufactured into finished products within the country, the above figures form one of the most accurate means of estimating the gradual growth of American industry, as compared to that of Great Britain. In 1917 the world production of pig iron was 64,515,000 tons, hardly double that produced in the United States, again indicating the place of this country as the greatest industrial power in the world. In 1918 the United States reached its highest point of pig iron production, the amount being just a little short of 40,000,000 tons. That year was also one of the most generally prosperous which had ever been experienced in this country. In 1921 the production of pig iron was under 17,000,000 tons, which is also a pretty accurate indication of the depth of the financial depression we were suffering during that period. The expert economist studies continuously the monthly rise or fall of the production of pig iron, and thus gauges the ebb and flow of the industrial condition of the country as the doctor judges the health of his patient by the beat of his pulse.

PIGMENTS are powdered coloring matters applied through a medium in which they are insoluble, When natural, they may be of mineral, vegetable (*e.g.* gamboge, indigo), or animal (*e.g.* cochineal) origin. Substantive pigments have an original color; adjective pigments (*e.g.* crimson lake) are precipitated on a colorless base (*e.g.* alumina).

Pigments must be finely ground in a drying oil (*e.g.* linseed) for oil paints, or in gum water for water colors. They must have stability and body, and must not interact, when mixed.

Important mineral pigments; lamp black and Indian ink (carbon), zinc white or Chinese white (ZnO), Venetian red and burnt sienna (Fe_2O_3), red lead (Pb_3O_4), white lead ($2PbCO_3$, $Pb(OH_2)$), viridian green (hydrated Cr_2O_3), vermilion (HgS), chrome yellow ($PbCrO_4$); cadmium yellow (CdS). Prussian blue is ferric ferrocyanide; carmine and crimson lake are cochineal combined with alumina. rose madder is alizarin (from *Rubia tinctorum*) with alumina. Indigo and alizarin are now prepared artificially.

PIGMY. See **PYGMY.**

PIKE, wooden weapon tipped with iron, and from 12 to 14 ft. long, used very extensively in war before introduction of bayonet.

PIKE, ZEBULON MONTGOMERY (1779-1813), an American soldier and explorer, *b.* in Lamberton, N. J. He entered the Army, and in 1805, after the purchase of Louisiana, was ordered to explore the headwaters of the Missouri River, which he did as far as Red Cedar Lake. After his return he lead a party through the territory included in the Louisiana Purchase, reaching as far as the present site of Leadville, Colo., and discovering Pike's Peak. He was killed at the beginning of the War of 1812 while defending a fort at York, on the Canadian frontier.

PIKE PERCH. See PERCHES.

PIKES (*Esocidoe*), long-bodied, slender, large-mouthed bony fishes, which are exceedingly voracious, feeding on their own kind and other fishes, and even on frogs, voles, and water-fowl; found only in the rivers of the N. hemisphere.

PIKE'S PEAK, an eminence of the Rocky Mountains, in Colorado, 14,108 feet above sea level, discovered in 1806 by Zebulon Montgomery Pike. Its sides are clad by pine forests, reaching to within a short distance of the top. In 1892 a station of the Weather Bureau was established on the summit, which has a level area of about 60 acres.

PILATE, PONTIUS (I. cent. A.D.); Rom. gov. of Judaea; procurator of Judaea, Idumea, and Samaria, 26-36; merciless tyrant according to secular historians; attitude towards Jesus Christ has made his character theme of much later speculation; Spenser's picture of him eternally washing his hands in hell is from old legend.

PILATUS, MOUNT, a height of the Alps, on the S. shore of Lake Lucerne, and between the cantons of Lucerne and Unterwalden. The Tomlishorn, its highest point, is 6,998 ft., and its ascent can be made by means of a railway. Its name is from 'pileatus,' capped; and not from its being the scene of the death of Pontius Pilate.

PILES, or HÆMORRHOIDS, a

swollen condition of the veins and tissues about the anus. They may be classified as *blind* or *bleeding*, according as to whether there is or is not absence of bleeding. A better classification is that by which P. are known as *internal* or *external*, according as to whether they are situated within or without the sphincter ani, the muscular ring which closes the anal orifice. In the former case they are covered with mucous membrane, and may be so protruded as to escape through the anal orifice; in the latter case they are covered with skin, and may either form hard tumors or discharge as bleeding P. P. are a symptom of any condition by which the veins of the lower bowel become congested. Habitual constipation, the condition of pregnancy, growths in the rectum, general weakness, and local inflammation are liable to be accompanied by the formation of P. They may make their appearance after a strong effort at defecation, or after sitting on cold or wet ground. They may cause little trouble when quite hard, but if strangulated by the sphincter ani or inflamed by any cause they are apt to occasion extreme discomfort and lead to loss of blood to an exhausting degree.

PILGRIMAGE, a journey to a religious place, embarked on as an act of piety. P's have been a special characteristic of Catholic Christianity, but they are found too in non-Christian religions. Thus the river Ganges is sacred to Hindus; the city of Benares on its banks is specially holy to Brahmans. Certain spots were sacred in classical Greece, *e.g.* Apollo's shrine at Delphi. Every pious Muhammadan must sometime visit Mecca. P. is not found in the first age of the Christian Church, but before long Christians naturally desired to tread in the footsteps of the Saviour. The supposed spot of the birth of Christ was pointed out in the IV. cent. From this time onwards large numbers of Christians came on pilgrimage to the Holy Land. These became more frequent when Constantine built the Church of the Holy Sepulchre, where formerly a temple of Venus had stood, on the site of the tomb of Christ. His mother, the Empress Helena, discovered as she thought the true Cross, and happy was the church which preserved any portion of it. Indeed, the possession of relics gave any shrine a fame which drew thousands of pilgrims to it.

In the Middle Ages the popularity of the p. steadily increased, and a visit to the Holy Land was viewed as a means of expiating sin.

PILGRIM FATHERS, name applied to the 102 Eng. separatists (74 males and 28 females), members of John Robinson's church at Leyden, who, on board *Speedwell* (60 tons), set sail from Delft Haven (July 22, 1620) under the leadership of William Brewster. Arrived at Southampton, they found *Mayflower* (180 tons); port of registry Yarmouth) awaiting them with their fellow passengers. The two ships set sail about Aug. 5 (15, N.S.), but *Speedwell* proving unseaworthy, both put in at Dartmouth, where repairs were undertaken, and again essayed the voyage. Off Land's End *Speedwell* was falsely declared by her master to be in a sinking condition, and again the vessels put about and reached Plymouth, where *Speedwell* was abandoned. On Sept. 6 *Mayflower left* Plymouth; arrived off Cape Cod, Nov. 9, and the pilgrims landed on 'Plymouth' rock on Dec. 11 (21, N.S.), where they founded the Plymouth Colony. Forefathers' Day is celebrated on Dec. 22. The Pilgrims are to be distinguished from the 'Puritans' who in 1629-30 founded the Massachusetts Bay Colony. The tercentenary of the departure of *Speedwell* and *Mayflower* from Southampton was celebtrated by an appropriate pageant on July 23, 1920. Plymouth held a similar festival in September, and elaborate commemorations took place during the year.

PILIBHIT (28° 48′ N., 79° 51′ E.); town, Pilibhit, United Provinces, Brit. India. Pope. 35,000; (district) 475,000.

PILKEM, vil. W. Flanders, Belgium (59° 54′ N., 2° 54′ E.). Pilkem ridge was a position of strategic importance during the three battles of Ypres, and was scene of much fighting. During the first battle Germans won a temporary success by succeeding in penetrating line at Pilkem; ridge was captured during third battle (July 1917).

PILLAR-WORSHIP. The pillar (Gk. *baitulos*) was a cult-object of early Hellenes and Semites. In the Dictaean Cave of Crete, the legendary birthplace of the Hellenic Zeus, a baetylic table of offering has been found, and Jacob's Bethel seems clearly to have been a similar observance. It is believed that the baetylic altar found at Cyrenaica was associated with the Libyan Zeus Ammon, and that Celtic dolmens are akin. These pillars seem, therefore, to point to a universal primitive religion.

PILL, a small round mass containing one or more medicinal ingredients intended to act upon the stomach or intestines. It is a form especially applicable to those drugs which are taken in small doses, and recommends itself to most people on account of the ease in

swallowing and the comparative absence of disagreeable taste.

'PILL BOX', type of concrete defence constructed by the Germans and largely employed in Flanders, where the watery ground made deep underground shelters impracticable. They were generally covered on top with earth, and had loopholes in their sides for machine guns. They constituted formidable points in the Ger. defence during the third battle of Ypres (Aug.-Nov. 1917), and were impervious to anything except a direct hit by a large shell. They inflicted heavy losses on the attacking infantry, but latterly a method was found of dealing with them, bombers usually creeping up until they got within shelter of the walls, when they burst open the door and threw hand grenades inside, compelling the inmates to surrender or perish.

PILLAU (54° 40′ N., 19° 56′ E.), fortified seaport, watering-place, E. Prussia, Prussia, at entrance to Frisches Haff; sail-making, shipbuilding. Pop. 7,000.

PILLORY, apparatus of punishment; board, with holes for head and wrists, mounted above platform.

PILONA (43° 16′ N., 5° 35′ W.), town, Oviedo, Spain. Pop. 19,000.

PILOT, a special steersman taken on board a vessel to take it into or from a port or through a particular channel.

PILOT-FISH (*Naucrates ductor*), so called on account of its supposed alliance with the Shark; a rare relative of the Horse-Mackerel; found in the open waters of the Atlantic and Pacific Oceans.

PILSEN (49° 45′ N., 13° 23′ E.), town, Bohemia, at confluence of Mies and Radbusa; famous *Pilsener* beer. Pop. 88,500.

PILSUDSKI, JOSEPH (1867), Polish soldier and statesman; for Nationalist views suffered imprisonment in Russia and in Germany; at outbreak of World War, on his own authority invaded Russia at head of Polish Legion (Aug. 6, 1914); became head of provisional government formed when the state of Poland was restored by the Treaty of Versailles, 1919; succeeded Paderewski as president (Dec. 1919) and exercised the powers of a dictator; as marshal of the army led the Poles in the invasion of the Ukraine, which resulted in the Bolshevist attack on Poland. He resigned as provisional president in 1922. See POLAND.

PILTDOWN MAN, OR PILTDOWN SKULL, terms applied interchangeably to a human skull recovered from a gravel deposit in Piltdown, Sussex, England, and first described in 1912. The skull was found not as an entity but in several fragments, and the discoveries of the various parts extended over several years. In the gravel where the skull fragments were found, there were fossil remains of an elephant, hippopotamus, rhinoceros and beaver. Assuming that these were contemporaneous, the skull is assigned to the Pleiocene period. Flint implements were also found but cannot be assigned to any certainty to any special age. The skull has been reconstructed by Dr. Smith Woodward and Mr. Dawson, its discoverers, and some of the parts that were missing have been restored by Prof. J. H. McGregor of Columbia University. The skull cap is represented by three pieces, each of very great thickness. A tooth, a bone from the nasal cavity and part of the lower jaw completed the find. Considerable doubt has been expressed as to whether the skull when reconstructed did not include parts of more than one skeleton, and the find is not regarded by anthropologists as of the first importance.

PIMENTO, JAMAICA PEPPER, ALLSPICE, fruit of *Eugenia Pimenta*, a tree of W. Indies; dried and sold as spice. Oil of Pimento, distilled from fruit, is a popular remedy for toothache.

PIMPERNEL (*Anagallis*), genus of plants, order Primulaceae; Scarlet P. (*A. Arvensis*), 'Poor Man's Weather-Glass,' closes its petals in dull weather; Bog P. (*A. tenella*) has large pink flowers.

PIMPLES, see ACNE.

PINA CLOTH, a beautiful fabric made by the natives of the Philippine Is. from the fibres of the leaves of the pine-apple plant (*Ananas sativa*). It is of a soft, delicate, and transparent texture, yellowish in tint, and can be most beautifully embroidered.

PINAR DEL RIO (22° 26′ N., 83° 32′ W.), city, Pinar del Rio, Cuba; trade centre for tobacco district of Vuelta Abajo. Pop. (1919); 47,858; (dist.) 261,198.

PINCHOT, GIFFORD (1865) governor; *b.* in Simsbury, Connecticut, August 11, 1865. Graduating from Yale in 1889 he studied forestry in France, Germany, Austria, and Switzerland. A. M. Yale and Princeton. L. L. D. McGill University. He began forestry work in the United States at Biltmore, N. C., in 1892. Member of the National Forest Commission 1896.; Forester and Chief of Division of Bureau of Forestry, now For-

est Service, Department of Agriculture 1898-1910. President of the National Forest Conservation Association since 1910. Professor of Forestry, Yale, after 1903. Commissioner of the Forests of Pennsylvania from 1920. He visited, and planned a policy for the Forests of the Philippine Islands in 1920. Commissioner of Public Lands appointed October 1903. Commissioner on department methods June 1905. Member of Inland Waterways Commission, Chairman National Forest Conservation Commission 1908. In 1922 he was elected governor of Pennsylvania by an overwhelming majority. Prominent as arbiter in coal strike of 1923.

PINCKNEY, CHARLES COTESWORTH (1746-1825), an American diplomat and politician, *b.* in Charleston, S. C. He studied law at Oxford University, in England, returned to this native city and during the Revolution Commanded the defense of Fort Moultrie during the second attack on Charleston, was taken prisoner and held for two years, after which he was exchanged. In 1787 he was a member of the Federal Constitutional Convention and was responsible for the clause declaring that no candidate or public official should be subjected to a religious test. In 1796 he was Minister to France, in 1800 Federal candidate for the Vice-Presidency, and in 1804 and 1808 candidate for the Presidency.

PINDAR, PINDAROS (*c.* 522-443 B. C.), Gk. lyric poet; *b.* Cynoscephalae, Boeotia; after preliminary education at Thebes, he studied music and poetry at Athens; after long study began to write choral odes, and attained great fame, not only in Greece, but in Sicily, Cyrene, and Magna Graecia. He was frequently entertained by potentates, notably by Hiero of Syracuse and Arcesilaus of Cyrene; died, probably at Argos, at age of 80.

His poems consisted of songs in praise of gods and men, processional songs, festal songs, dirges, and paeans of victory, besides poems on other themes. A great part of his work has been lost, but his songs of victory (*Epinikia*) have come down to us in four books, describing and praising the victors at the four Greek games—Olympian, Isthmian, Pythian, and Nemean. The discoveries at Oxyrhynchus (1905-7) provided several hitherto unknown poems of P.

PINDARICS, a form of verse, so called from its imitation of the irregular odes of Pindar (*q.v.*).

PINDUS, (39° 15′ N.; 21° 46′ E.), range of mountains in Greece, separating Thessaly and Epirus; highest elevation, 7000 ft.

PINE (*Pinus*), evergreen coniferous trees of typically symmetrical appearance this being due to the production of annual pseudo-whorls of branches. These produce scale leaves in the axils of which dwarf shoots, or 'foliar spurs,' arise, each bearing from two (*Pinus sylvestris*) to five (*P. strobus*) needle-shaped leaves. Each scale bears two winged seeds, containing an embryo with a whorl of cotyledons, embedded in a rich nutritive tissue. On this account the seeds of some species (*P. pinea*) are utilised as food. The p's (including *P. sylvestries*, the Scots *Fir*) are of immense value as timber trees, *P. sylvestris* yielding deal, *P. palustris*, pitch-pine, and *P. echinata*, yellow pine, whilst in addition turpentine is obtained by tapping the trunks of various species, and also by distillation of the resin exuded from the wounds. Tar and pitch are yielded on destructive distillation in closed chambers.

PINE APPLE (*Ananas sativa*), plant of order Bromeliaceae, native of tropical America; sharp leaves spring from root, and in centre flowers grow on a spike; largely cultivated in W. Indies, Florida, Hawaii and the Azores.

PINE BLUFF, a city of Arkansas, in Jefferson Co., of which it is the county seat. It is on the St. Louis, Southwestern, and the St. Louis, Iron Mountain and Southern railroads, and is the center of an extensive agricultural and cotton growing region. It has also an important trade in lumber. Its industries include railroad shop, cottonseed oil works, boiler works, and sheet iron works. It is the seat of the State Colored Normal School and the Merrill Institute. It has a library, a court house and other public buildings. Pop. (1920) 19,280.

PINEL, PHILIPPE (1745-1826), Fr. physician, chief physician at the Salpetriére and prof. of Pathology at Ecole de Médecine, Paris; one of first to advocate humane treatment of the insane. See INSANITY.

PINERO, SIR ARTHUR WING (1855), Eng. dramatist; on the stage (1874-81); first noted play *The Money-Spinner* (1881); at Court Theatre were produced (1885-98) series of comedies—*The Magistrate, The Cabinet Minister, Trelawney of the Wells*, etc.; wrote also *Sweet Lavender, The Hobby Horse, The Second Mrs. The Hobby Horse, The Second Mrs. Tanqueray, The Princess and the Butterfly, The Gay Lord Quex, His House in Order, Playgoers* (1913), *The Big Drum* (1915), *Mr. Livermore's Dream* (1917), etc.; was knighted in 1909.

PINEROLO (44° 53′ N., 7° 19′ E.), city, Turin province, Italy; cathedral; textiles; formerly important Fr. fortress. Pop. 18,500.

PINES, ISLE OF.—It lies 35 miles S. of Cuba, to which it belongs; in the Province of Havana, area 896 square miles. The scenery is attractive and diversified. There are mountains and plains, bays, and streams. The climate is mild. Fine marbles are quarried in the mountains of Sierra de los Cabellos and Monte Casas. The principal products are cattle, tobacco, fine woods and pine, sulphur, turpentine, pitch, and tar. The isle was discovered by Columbus in 1494, and it was long a pirates' nest. The population is mostly gathered in the towns of Santa Fe and Nueva Gerona, the capital. Population (1919), 9,901.

PINGREE, HAZEN S. (1842-1901), an American public official, *b.* in Denmark, Me. He took part in the Civil War, and thereafter engaged in the shoe business in Detroit, in which he acquired great wealth. He was elected mayor of the city in 1889 on a Reform ticket, and attracted much attention by his opposition to the method of operating the street railways. He brought about many reforms in the city's administrations. In 1897 he was elected Governor of Michigan and again in 1898.

PING-YANG (Korean *Phyong-yang*), a walled city of Korea; cap. of the prov. of Pyong-yang; on the Tatong River, 36 miles from its mouth; is open to foreign trade. It is supposed to date from 1122 B.C., and was the scene of great battles between the Chinese and Japanese, in 1592 and 1894. Pop. 75,000.

PINK, (*Dianthus caryophyllus*), a member of the Caryophyllaceae, garden varieties of which are largely grown on account of their scent and attractive appearance. The plant is often propagated by layering, but is easily raised from seed.

PINK EYE, a disease of horses; symptoms are—high temperature, loss of appetite, redness of eye, stiffness and swelling of joints, constipation; treatment—stimulation of heart to prevent clotting of blood, laxatives, absolute rest.

PINKERTON, ALLAN (1819–84), Amer. detective; b. Glasgow; emigrated to America, 1842, to escape imprisonment as a Chartist; first detective for Chicago, 1850; organized secret service division of the N. Army at the Civil War, and established detective agency. Pub. various stories.

PINKNEY, WILLIAM (1764–1822), an American diplomat, *b.* in Annapolis, Md. He graduated from King William's Seminary, studied law and began to practice in 1786. In 1806 he was sent as Minister to England and during 1811–12 he was Attorney-General. In 1816 he went to Russia as Minister, and in 1820, he was elected to the U. S. Senate.

PINNACE, formerly a small two-masted vessel, fully rigged, and employed as tender to larger ships. In the British navy, the term is now applied to a boat larger than a cutter, with eight banks of oars and provided with sails. All British men-of-war now carry steam P's.

PINNACLE, architectural term for stone upright ending in spired point, used in Gothic architecture.

PINOCHLE, PENUCHLE, card game played with two packs; cards from two to eight discarded; combinations of cards sought, as in bezique.

PINS, brass wire is drawn to requisite length; head shaped by die; dropped into slot and pointed by rotating cutter; coated with tin; formerly made with separate heads. P's and safety p's of various metals are found on prehistoric dwelling sites and in classical remains.

PINSK, tn., Minsk, Ukraine (51° 45′ N., 26° 7′ E.), 140 m. s. s. w. of Minsk; potteries, tanneries, breweries, oil and soap works. During World War was taken by the Germans at the close of the Russian retreat (Sept. 1915). There are extensive marshes in the neighborhood, and here the Ger. advance stopped; seized by the Poles and recovered by the Bolshevist Red armies (1920). Pop. 28,000.

PINT, see WEIGHTS AND MEASURES.

PINTO, contagious disease, occuring in Mexico and Central America, in which the whole body is discolored brown, blue, and black; due to a vegetable parasite.

PINTO, FERNAO MENDES (1509–83), Portuguese traveller and writer; set out for East, 1537; visited Japan, 1542; joined Jesuits and undertook mission to Japan, 1556, but deserted Order 1558; returned to Portugal and wrote famous *Peregrination.*

PINTURICCHIO, BERNARDINO DI BETTI (1454–1513), Ital. painter; executed large number of frescoes, including six on the walls of the Vatican library. At one time he was assistant to Perugino; painted also some fine panel pictures.

PINZON, family of Span. sailors who claim to share with Columbus honor of

discovering America; Martin Alonzo (d. 1493), and his bro's, Vicento Yanez and Francisco, supplied Columbus with funds and sailed in his expedition, 1492–93.

PIOMBINO (42° 55′ N., 10° 31′ E.), seaport, province Pisa, Italy, on Mediterranean. Pop. 8000.

PIOMBO, SEBASTIANO LUCIANI DEL (1485-1547), an Italian painter; *b.* in Venice. He studied under Bellini, and other artists, and in 1512 came to Rome, where he attempted to surpass Raphael, by painting the raising of Lazarus. He painted other important works relative to the Holy Family and the life of Christ. He painted also portraits of many of the great personalities of his time.

PIONEER ('a foot soldier,' O. Fr. *peonnier*, ultimately from Lat. *pes*, a foot), one of a party or company of foot soldiers who precede the regular army to make or clear roads, prepare camp, dig entrenchments, etc. They are equipped with spades, axes, etc., with which to carry out these operations. From the function of pioneers the word is applied figuratively to any one who leads the way or breaks new ground in any branch of scientific inquiry, etc.

PIOTRKOW, (51° 30′ N., 19° 40′ E.), gov., Poland; undulating and hilly; well cultivated; lignite and iron deposits; textile industries. Pop. 1,933,400. Capital, Piotrkow (51° 25′ N., 19° 45′ E.), manufactures flour. Pop. 40,000.

PIOZZI, HESTER LYNCH, (1741–1821), Eng., writer; the Mrs. Thrale immortalised by Dr. Johnson; a prolific writer, but it is not as an author so much as the devoted friend of the lexicographer that she will be remembered. Only second to Boswell in literary interest are her *Anecdotes of Dr. Samuel Johnson*.

PIPA AMERICANA, or **SURINAM TOAD**, a large, tongueless toad, the only representative of its genus and family, and peculiar to Dutch Guiana. Its most remarkable feature is the hatching of the eggs on the back of the female.

PIPAL, BO TREE, sacred Fig of Hindus, who believe Vishnu was born under it.

PIPE.—(1) musical instrument consisting of pierced cylinder; mediaeval p. had three holes; was chromatic; Highland bag-p. has eight holes, one in back; achromatic. (2) device for smoking tobacco, probably N. American in origin, though some authorities hold that p. was used by ancients for smoking aromatic herbs; first made of stone, now of wood, clay or meerschaum; briar p. most popular.

PIPE-FISHES AND SEA-HORSES, (*Syngnathidae*), some 175 species of very long, slender fishes, with bodies covered by bony rings; found in almost all seas. Many of the males possess a brood pouch in which the eggs are retained until hatched. Five kinds of Pipe-Fishes, distinguished by their long, hard snout, occur on Brit. coast, as also does the peculiar Sea-Horse (*Hippocampus*), which clings to seaweeds by its prehensile tail, but it prefers warmer S. seas.

PIPE LINES, see **OIL PIPE LINES**.

PIPERNO, (41° 28′ N., 13° 12′ E.), town, ancient Privernum, Rome, Italy, on Amaseno. Pop. 7000.

PIPRAWA, village on Birdpur estate, in Basti district, United Provinces, India. Buddha's birthplace is only 12 miles distant; there after excavation, many finely wrought articles—now in Calcutta Museum—were discovered in a ruined tope or burial-mound.

PIQUA, a city of Ohio, in Miami co. It is on the Cincinnati, Hamilton and Dayton, the Pittsburgh, Cincinnati, Chicago and St. Louis, and other railroads, and on the Miami River. It has manufactures of steel, iron, stoves, woolen goods, etc. Pop., 1920, 15,044.

PIQUET, card game, prob. of Fr. or Ital. origin; two players participate; pack prepared by discarding from two to six in all suits; no trumps; game of six hands. If loser scores over 100 points his score is deducted; if under, he is penalised by being *rubiconed*, i.e. score added to opponent's.

PIRACY, consists in committing on the high seas such acts of robbery and depredation as, if committed on land, would amount to a felony. The following actions are statutory piracies in Brit. law: (1) acts of hostility by a subject under color of a foreign commission; (2) running away with a ship, or mutiny; (3) trading with pirates; (4) assisting an enemy in time war; (5) slave dealing. The punishment is penal servitude for life or less, but piracy accompanied by attempted murder or unlawful wounding is still punishable by death. Notable pirates of the past were the corsairs of N. Africa, and the successors of the buccaneers on the Span. Main. Except perhaps in Chin. waters, piracy is practically unknown in modern times.

PIRÆUS, PORTO LEONE, or **DRACO**, a tn. of Attica, Greece, the seaport of Athens since about 485 B.C., an important port and harbor both

in ancient and modern times. Themistocles recognized its superiority to Phalerum and persuaded his countrymen to fortify it after the Persian wars, and connect it with Athens (about 5 m. N. W.) by the famous 'Long Walls.' Cimon and Pericles in the 5th century B.C., carried out the plan of Themistocles. It had had three harbors, the largest being W. of the peninsula on which the town stood, and was the abode chiefly of the democratic Athenian population and of foreigners. Munychia to the S. was the Acropolis of the P., on a hill now called *Kaoreyya*. The fortifications were destroyed (404 B.C.) after the Peloponnesian War, but restored in 393. Sulla destroyed them again (86 B.C.), and from that time the town sank into obscurity until 1834. A railway was constructed (1869) connecting it with Athens. It is the chief port of entry for imports, locally known as the Manchester of Greece.' Marble from the quarries of Pentelicus, Skyros, and Tinos, olives, and oil are exported. Cottons, silk, paper, machinery iron, macaroni, and flour are manufactured, and there are tanneries, distilleries, and shipbuilding-yards. Coal, railway plant, petroleum, and cattle are among the chief imports. Pop. 73,579.

PIRANO, (45° 32′ N., 13° 34′ E.), seaport, Istria, Austria, on Gulf of Trieste; exports salt. Pop. 15,000.

PIRKE ABOTH, 'Sayings of the Fathers,' part of the Mishnah; a book of proverbs illustrating Judaism just before time of Christ; Hebrew, but partly in Aramaic; printed in Jewish Prayer Book.

PIRMASENS, (49° 12′ N., 7° 37′ E.), town, Rhine Palatinate, Bavaria; boots and shoes. Pop. (1920), 39,611.

PIRNA, (50° 57′ N., 13° 56′ E.), town, on Elbe, Saxony; sandstone quarries, glass-works. Pop. 10,000.

PIROT, (43° 12′ N., 22° 35′ E.), town, department Pirot, Serbia; manufactures cloth; scene of defeat of Servians by Bulgarians in 1885. Pop. (1920), 10,700; (department) 100,000.

PISA, (43° 43′ N., 10° 23′ E.), city, N. Italy (Tuscany), on Arno, capital of P. province, with well-preserved walls and fine quays along river known as Lung' arno. Outstanding features are cathedral of white marble (XI. cent.) with magnificent facade and valuable paintings by Andrea del Sarto, Salembeni, and others; marble baptistery (begun 1153), with famous pulpit by Niccola Pisano and fine marble font; Campanile or Leaning Tower (1174–1350), 183 ft. high; Santa Caterina (XIII. cent.), San Niccolo, Santa Maria della Spina, San Francesco, and other churches; Campo Santo, burial ground (founded XIII. cent. by several shiploads of earth from Jersualem) surrounded by cloisters with frescoes by Tuscan and other painters, Univ. (La Sapienza, 1338), with library, natural history museum, and botanical garden; Communal, Agostini, Upezzinghi, and other palaces; Museo Civico, with fine art collection; manufactures of silks, cottons, coral and alabaster work; royal stud-farm; horses and dromedaries in vicinity. P. was a Rom. colony, 180 B.C.; important commercial center and one of greatest naval powers in XI., XII., and XIII. cent's; continuous wars with rivals, Venice and Genoa, led to final defeat by Genoese at *Meloria*, 1284; conquered by Florence, 1406; became independent under Charles XIII. of France, 1494; retaken by Florentines, 1509. In XII. and XIII. cent's P. held a prominent place in the history of art; birthplace of Galileo (*q.v.*). Pop. 67,300.

PISA, COUNCIL OF (1409), Church Council, purporting to be general, held during great Western Schism, 1409. It deposed rival popes and elected Alexander V.; important in Conciliar movement as leading the way to Council of Constance; generally held not aecumenical. Other councils were held at P. in 1134 and 1511.

PISAN, CHRISTINE DE (1363–*c.* 1429), Fr. poetess; *dau.* of Venetian astrologer of King Charles V. of France. Amongst her numerous productions are *Faits et bonnes Moeurs de Charles V.*,

PISANO, NICCOLA (*c.* 1206-78), eminent Ital. sculptor, architect, and engineer. Three important and excellent works of his survive, *viz.* the pulpit in Siena Cathedral, the shrine in St Dominic's, Bologna, and the pulpit of the Baptistery, Pisa.

PISAURUM, modern Pesaro (*q.v.*) (45° 55′ N., 12° 55′ E.), ancient town on Via Flaminia, Umbria, Italy.

PISCES. See FISHES.

PISICULTURE, the artificial breeding and rearing of fishes from the egg for the purpose of stocking suitable localities with young fishes. The aim of pisiculture is to guard and shield the embryonic fishes during the early stages when they are so liable to wholesale destruction, until they are able to fend for themselves—that is to say, until at least the yolk sac is wholly absorbed. Methods of hatching and rearing have long been carried out in specially adapted hatcheries, where especially trout and salmon were dealt with; but great advances have been made as regards edible

marine creatures and many plaice and other marketable fishes, and even lobsters are hatched and released on suitable grounds every year. Artificially propagated fry have been 'planted' in waters where their species was previously unknown, with excellent results—(*e.g.*), the shad on the Pacific coast of N. America.

PISEK (49° 18′ N., 14° 10′ E.), town, on Wottawa, Bohemia, Austria; iron foundries. Pop. 16,000.

PISIDIA, a rugged and mountainous country of ancient Asia Minor, immediately N. of Pamphylia; boundaries not clearly defined; occupied from early times by wild and lawless people; traversed by St. Paul.

PISISTRATUS. See PEISISTRATUS.

PISO, Rom. surname in *gens* Calpurnia. From beginning of II. cent. B.C. this plebeian family produced many distinguished statesmen and generals; Caesar's wife belonged to this family.

PISTACIA, genus of small trees, order Anacardiaceae; flowers are diaecious and have no petals; fruit is a single-seeded dry drupe; *P. vera* yields Pistachio Nut used in cooking; *P. lentiscus* gives Mastic, a gum-resin; and from *P. terebinthus* Cyprus Turpentine is obtained.

PISTIL. See FLOWER.

PISTOIA, PISTOJA (43° 57′ N., 10° 55′ E.), town, Tuscany, Italy, near river Ombrone; of considerable importance during Middle Ages; contains many buildings of great sculptural and architectural interest; manufactures include iron- and steel-ware, small-arms, glass, and textiles. Pop. 63,000.

PISTOIA, SYNOD OF (1786), assembled under auspices of grand-duke of Tuscany; declared Bible and Fathers to be test of faith, etc.; condemned by Pope, 1794.

PISTOLE, the name given to certain gold coins, formerly current in Spain, Italy, and several parts of Germany, but now obsolete. It was first used in Spain, and was then equivalent to about 11 old French livres. From 1728-72, it was worth 17*s.* 1*d.* sterling, but it gradually decreased in value, and was finally withdrawn.

PISTOLS.—As early as 1570 a firearm to be held and fired with one hand—that is, a pistol— was used by cavalry. A century later pistols were made with three brass barrels which unscrewed to load; they were fired by flint and steel. Like the musket, the pistol has undergone many changes in regard to its bore and the mechanism for loading and firing.

The latest type of pistol is 'automatic,' which relieves the firer of all manipulation except the replenishing of the magazine, taking aim, and pressing the trigger.

PISTONS or **VALVES,** in brass musical instruments, are mechanical contrivances whereby the gaps in the instrument's natural scale of sounds are filled up. They lengthen or shorten the vibrating column of air in the tube, and so produce alterations of pitch.

PISTON VALVES. See VALVES.

PITCAIRN (25° 5′ S., 130° 5′ W.), island S. Pacific; area, 2 sq. miles; produces coffee, fruits. Discovered 1767, and peopled in 1790 by mutineers of the *Bounty*; annexed by Britain, 1839. Pop. 170.

PITCAIRNE, ARCHIBALD (1652-1713), Scot. physician; prof. of Med. at Leiden, 1692; returned to Edinburgh to become the most eminent physician of Scotland.

PITCH is the term generally used to denote the precise degree of acuteness or gravity of any given musical note or notes. Musical sounds are produced by a series ff vibrations, and accordigg to the number of vibrations so is the sound of higher or lower pitch. More precisely, p. is the recognised standard according to which voices and instruments are set or tuned. In that sense, it is synonymous with the term, 'concert pitch.'

PITCHBLENDE, $U(UO_4)_2$, uranate of uranium, a mineral, the source of uranium and radium (*q.v.*), composed largely of oxide of uranium and generally found with uranite; color, brown or black.

PITCHER-PLANTS, forms in which the whole leaf (*Sarracenia Darlingtonia*) or the apical portion (*Nepenthes*) is modified to form a lidded pitcher-like structure for the capture and digestion of insects.

PITCH PINE. See PINE.

PITCHSTONE, an acid volcanic glass occurring in dykes in S. Europe, S. America, and the Hebrides; has a greasy lustre resembling pitch. Colors: green, brown, yellow, blue, and black.

PITESCI, PITESHTI (44° 52′ N., 24° 52′ E.), town Argesh, Rumania, on Argesh. Pop. 16,500.

PITHECANTHROPUS ERECTUS, a genus of Anthropoid Ape, represented

by a few fossil bones from Java, and believed to link the highest apes to man.

PITHIVIERS (48° 11′ N., 2° 15′ E.), town, on (Euf, Loiret, France; trade in grain, saffron. Pop. 6300.

PITIGLIANO (42° 36′ N., 11° 32′ E.), town, Grosseto, Italy. Pop. 5,000.

PITLOCHRY (56° 42′ N., 3° 44′ W.), village, health-resort, Perthshire, Scotland.

PITMAN, BENN (1822-1910), an Anglo-American educator, *b.* in Trowbridge, Wiltshire, England. He studied in the phonographic institute of his brother, Sir Isaac Pitman, taught for a while in England and in 1853 came to the United States and established the Phonographic Institute at Cincinnati, Ohio, of which he remained for a long time president. He wrote "*A Manual of Phonography*" (1854); "*A History of Shorthand*" (1858); "*A Plea for American Decorative Art*" (1895), and "*A Phonographic Dictionary*" (1899).

PITMAN, SIR ISAAC (1813-1897), the inventor of the system of shorthand known by his name, born at Trowbridge, Wiltshire. While teaching as a schoolmaster at Wotton-under-Edge, he published his *Stenographic Sound Hand*, and later gave himself up entirely to the work of spreading the system there propounded.

PITNEY, MAHLON (1858), an American justice, *b.* at Morristown, N. J., son of Henry C. (formerly vice-chancellor of New Jersey) and Sarah Louisa Halsted Pitney. He was educated at Princeton University. He was admitted to the bar in 1882 and practiced at Morristown, New Jersey. Later he was elected to the 54th and 55th Congresses (1895-9), was a member of the New Jersey Senate from 1899-1901, associate justice of the Supreme Court of New Jersey, and then chancellor of New Jersey for the term of 1908-15, but resigned in 1912 to become associate justice of the Supreme Court of the United States succeeding John M. Harlan, deceased. He resigned in 1923.

PITT, THE ELDER, see CHATHAM, 1st EARL OF.

PITT, WILLIAM (1759-1806), Brit. statesman; second son of 1st Earl of Chatham; called to bar (1780); member for Appleby, Cumberland (1781); took important part in Opposition side, especially denouncing the war with the Amer. colonies. On the death of Rockingham (July 1782), Shelburne became prime minister and the youthful Pitt chancellor of the Exchequer. The Shelburne government came to grief in 1783 over the preliminaries of peace with the Americans. The Portland coaliton ministry (including Fox) was formed in April, 1783, but was dissolved by the king in Dec., 1783, and Pitt formed new cabinet. His cabinet was without ability and opposed by House of Commons, led by Fox, but he was supported by king and lords, and, as son of Chatham, by the country, and the result of a general election (1784) was a triumph for the government. Pitt sat for the univ. of Cambridge thenceforward. He proceeded to restore Britain to the position in Europe, she had lost by the Amer. War, restored national credit by his genius for finance, initiated a scheme of offering public loan for private tender, lowered the tea duties, and suppressed smuggling, etc. He had already brought in bills for parliamentary reform, and made a last vain effort to extinguish rotton boroughs (1785), and now attempted to establish free trade with Ireland, but failed, owing to the outcry of Eng. manufacturing interests; carried a commercial treaty with France (1786), strongly opposed by landed interest; alienated powerful interests by his attempted partial abolition of the slave trade (1799); passed India Bill reforming the E. India Co. on a new basis (1788).

When the Fr. Revolution broke out Pitt did not perceive its international importance until his ally, Holland, was attacked (1792), and until he was forced to repress seditious writings and call out the militia in London. War with France was declared (1793). Pitt's war policy was designed to break the power of France on land and to maintain England's supremacy at sea. He succeeded in the latter, but failed in the former, because, owing to the weakness of the Eng. army, he had to carry on the war on land by subsidizing half-hearted allies. To carry out this, heavy taxation was necessary, and to suppress sympathy with the Revolution drastic coercion laws were passed, the Habeas Corpus Act being suspended (1794). Pitt, induced by the Irish rebellion of 1798, passed the Act of Union (1800), but quarrelled with the king on Catholic Emancipation, and resigned.

Again called to office (1804), he formed a new coalition (1805) against Napoleon. Petty parliamentary attacks completed the ruin of his health ,and he never recovered his spirits, after news of Austerlitz.

PITTAS, or OLD WORLD ANT-THRUSHES (*Pittidoe*), a family of about 70 Perching Birds, with brilliant crimson, green, and blue plumage, found

in the tropics of Africa, South-East, Asia, Australia, and the intermediate islands.

PITTMAN, KEY (1872), an American author, *b.* at Vicksburg, Miss., *s.* of William Buckner and Catherine Key Pittman. He was educated by private tutors and at Southwestern Presbyterian University, Clarksville, Tenn. In 1892 he began the practise of law in Seattle, Wash., however in 1897 he joined the gold rush to the Klondyke and worked as a common miner for 2 years after which he went to Nome, and participated in the organization of a "consent" form of government and later was the 1st district attorney there. He was elected U. S. Senator by popular vote in 1912 to fill the unexpired trem, ending Mar. 4, 1917, of George S. Nixon, deceased and was re-elected for the term of 1917-23.

PITTSBURGH, a city of Kansas, in Crawford co. It is on the Atchison, Topeka and Santa Fe, the Missouri, Pacific, the St. Louis and San Francisco, and other railroads. It is the center of an extensive coal mining region and it has foundry and machine shops, packing houses, etc. There is a public library and the State Normal Manual Training School. Pop. (1920) 18,052.

PITTSBURGH, a city of Pennsylvania, in Allegheny co. of which it is the county seat. It is on the Pennsylvania System, the Baltimore and Ohio, the New York Central, the Wabash, and other railroads, and at the junction of the Monongahela and Allegheny rivers, at the head of the Ohio river. It is the second city of the State in industrial and commercial importance and also in population. The chief industries are the production of iron and steel, in which the city is pre-eminent. It is known as the Steel City, for every product of steel and iron is manufactured here, including locomotives, bridges, nails and watch springs. There are in the city, in addition to blast furnaces and iron and steel works, over 2,500 manufacturing establishments which give employment to over 75,000 people. Next to iron and steel products, glass is the most important manufacture. There are also large tanneries, paper bag factories, boot and shoe factories, white lead plants, etc. Lumbering and pork-packing are also of great importance. Pittsburgh has about 1,000 miles of paved streets and over 500 miles of street railways. The city has a total area of 41.61 square miles. It has many important public buildings, including Allegheny Courthouse; Carnegie Foundation, including Carnegie Institute; Museum of Art and Science; St. Paul's Cathedral; Masonic Temple and many handsome business buildings, hotels and theatres. There are nearly 100,000 children enrolled in the public schools and there is also an excellent system of night schools, kindergarten, and manual training schools. Institutions for higher education include the University of Pittsburgh, Western University of Pennsylvania, Duquesne University, Pittsburgh Female College, and the School of Design for Women, Carnegie Institute of Technology, Bishop Bowman Institute, and many private and semi-public institutions. In the city are over 250 churches and many charitable institutions, including several hospitals. Pittsburgh was founded in 1774 with, at the suggestion of George Washington, the English erected a block house on the present site. They were, however, driven away by the French, who erected a for at the junction of the two rivers and named it Duquesne. After two unsuccessful attempts to capture the place it was taken by the English under General Forbes, in 1758. In the following year another fort was erected and named in honor of William Pitt. Shortly after a village was established by English and Scottish settlers. The British withdrew from the post in 1772 and it was held by Virginia from 1775 to 1779. It was incorporated as a city in 1816. It now includes the former city of Allegheny. Pop. (1920), 588,343.

PITTSBURGH, UNIVERSITY OF, an institution founded at Pittsburgh, Pa., in 1819, under the name of the Western University of Pennsylvania. The present name was assumed in 1908. It has a library containing 100,000 volumes, and a yearly income of over $730,000. In the fall of 1921 there was a student enrollment of 3,194, and 1,905 special students. The members of the faculty numbered 590.

PITTSFIELD, a city of Massachusetts, in Berkshire co., of which it is the county seat. It is on the New York, New Haven and Hartford Railroad, and on the Housatonic river. It includes about a dozen villages. The industries include the manufacture of cotton and woolen goods, silk, knit goods, shirts, shoes, paper making machinery, paper, brick, electric machinery and brass castings. It is in the Berkshire Hill region and is a favorite summer resort. Its public buildings and institutions include several private schools, the Berkshire Athenaeum, public library, House of Mercy Hospital, and Berkshire County Home for Aged Women. Pop. (1920), 41,534.

PITTSTON, a city of Pennsylvania,

in Luzerne co. It is on the Lehigh Valley, the Lackawanna, and Wyoming ley, the Lackawanna and Wyoming Valley, the Lackwanna, and other railroads, and in the Susquehanna River. It is in the extensive mining region, and its industries are chiefly identified with that industry. There are, however, knitting mills, silk mills, foundries, car wheel works, engine works, etc. The city was founded about 1770, and was incorporated in 1894. Pop., 1920, 18,497.

PITYRIASIS VERSICOLOR, skin disease, consisting of irregular, dry, yellowish patches, usually on front of the trunk, due to a parasitic fungus, *microsporon furfur.*

PIURA (5° 12′ S., 80° 52′ W.), coast department, N. Peru; area, 16,825 sq. miles; capital, P.; produces petroleum, tobacco, cotton; live stock raised. Pop. *c.* 220,000.

PIUS II., AENEAS SILVIUS PICCOLOMINI (1405-64), pope. He was made cardinal, 1448, and elected pope 1458. He defended the papal claims as against councils, and did what he could to stir up Europe against the Turks.

PIUS IV., GIOVANNI ANGELO MEDICI (1499-1565), pope; cardinal, 1549, and pope, 1559.

PIUS V., MICHELE GHISLERI (1504-72), pope; in early life a Dominican; became grand inquisitor, and was elected pope, 1566. He urged on the the persecution of Alva, excommunicated Queen Elizabeth, and drove the jews from Rome.

PIUS VI., GIOVANNI ANGELO BRASCHI (1717-99), pope; cardinal, 1773; pope, 1775. An able administrator, he carried through several reforms in the papal States. Rome was captured by the French, 1798, and Pius taken prisoner.

PIUS VII, LUIGI BARNABA CHIARAMONTI (1740-1823), pope, cardinal, 1785; pope, 1800. He formulated the Concordat, 1801, and crowned Napoleon in Paris, 1804; but later relations became strained and Pius was taken off, only returning to Rome, 1814.

PIUS IX., GIOVANNI MARIA MASTAI-FERRETTI (1792-1878), pope; cardinal, 1840; elected pope on the death of Gregory XVI, 1846. In 1859 the pope lost most of his dominions, the patrimony of St. Peter was annexed, and the Papacy thus deprived of all temporal possessions, in 1871. The doctrine of the Immaculate Conception of the Virgin was promulgated, 1854, and the Infallibility of the Pope in the Vatican Council of 1870.

PIUS X (1835-1914), pope, elected to succeed Leo XIII., on August 4, 1903. His name was Guiseppe Sarto, and prior to his elevation to the papacy he was a cardinal and patriarch of Venice. He was born in Italy of a peasant family. He became a priest in 1858, bishop in 1866, and cardinal in 1883. In 1907 he issued an encyclical against modernism and in the same year raised large sums for the victims of earthquakes in Italy. He *d.* after a brief illness, in 1914.

PIUS XI. (ACHILLE RATTI), pope (1857), Pope; succeeding Benedict XV. in 1922; *b.* Desio, Italy. He studied in the diocesan seminaries and at the Lombard College in Rome, where he obtained doctor's degrees in theosophy, theology, and common law. He became a priest in 1879. From 1882 to 1888 he was professor of dogmatic theology and sacred eloquence in the seminary of his diocese, afterwards joining the staff of the Ambrosian Library, of which he became head in 1907. Called to the Vatican in 1911 as assistant prefect of the library, he was appointed prefect two years later. In 1918 he went to Poland as Apostolic Visitor, and the next year became Papal Nuncio. In 1919 he was also promoted to the Titular See of Lepanto as Archbishop. Two years later he was created a Cardinal and translated to the Archdiocese of Milan as Cardinal Archbishop. Upon the death of Benedict XV. he was selected by the College of Cardinals as his successor, and was crowned on February 12, 1922.

PIUTE INDIANS, a small tribe of Indians, in Utah. The name is also given to a number of Shoshone tribes of Utah, Nevada, and other S.W. states.

PIZARRO, FRANCISCO (*c.* 1475-1541), Span. conqueror of Peru (*q.v.*) as a boy served under Gonsalvo di Cordova in Italy; was with Balboa when he discovered the Pacific; along with Almagro (*q.v.*) set out for Peru, but having few men sent Almagro for reinforcements the governor of Panama gave small help. P. went to Spain and received the royal ssent to his undertaking conquest of Peru; landing in Peru, he marched inland, captured the Inca Atahualpa by treachery and strangled him. P. and Almagro set up Manco as nominal Inca; they founded Lima as the new capital, 1535. P. quarrelled with Almagro about their respective shares of land, and in civil war Almagro was slain. P. was finally assassinated by Almagrists

PIZARRO, GONZALO (1502-1548), *half-bro.* of F. Pizarro. He was appointed governor of Quito, in 1540, by his *bro.*, and after the assassination of the latter, raised an army against the new viceroy, Nunez, and defeated and slew him, in 1546. He was soon after defeated and beheaded.

PLACENTA, the structure by which a foetus is nourished in the uterus, or womb of its mother, and which is expelled after the young is born, constituting, with the membrane, the "afterbirth.' When the fertilised ovum reaches the uterus it becomes embedded in the decidua, or thickened lining of the uterus, and gradually enlarges. Processes, or villi, grow out from the ovum into the deep parts of the decidua on which it lies, where blood sinuses are formed, filled with maternal blood, into which the thin-walled, vascular, foetal villi hang free, dissolved substances in the two bloods are exchanged by diffusion, the foetal and maternal blood never becoming intermixed, and nourishment thus taken up for the foetus. This forms the placenta, and to it the foetus is attached by the allantoic stalk, which later becomes elongated and is known as the umbilical cord. The fully developed human placenta is a circular disc-like structure, seven or eight inches in diameter, about 1¼ inches thick at the centre, and becoming thinner at the edges, and weighing about 1 lb.

PLACENTA, in botany, the development of cellular tissue at the inner suture of a carpel, to which the seeds are attached.

PLAGIOCLASE, an important group rock-forming minerals; occurs as primary constituent of igneous rocks.

PLAGIASTOMI. See FISHES.

PLAGUE, term formerly applied to any epidemic disease of considerable mortality, but now restricted to a particular malignant contagious disease caused by a specific bacillus, the *Bacillus pestis*, and characterized by buboes, or swellings of the lymphatic glands, and carbuncles. The Black Death of the 14th cent. is supposed to have been true bubonic plague. Its last appearance in England, with the exception of occasional cases in seaport towns—notably in Glasgow—was the Great Plague of London (1665), when about 10,000 people died. During 19th cent. plague in Europe has been confined almost exclusively to Turkey and S. Russia. In 1898, 1904, and 1905 plague raged with fatal violence in India, and it has also appeared of recent years in other parts of Asia and Africa, and in San Francisco and several Australian ports.

The symptoms of plague usually include a preliminary stage of depression and pains, but the onset of the disease is sudden, with shivering, and the temp. rising to 103 deg. or even three or four degrees higher; there may be delirium, and there is marked prostration, headache, dizziness, and lethargy. In one or two days swellings usually appear, due to the inflamed glands, singly, or in groups, which may be vary painful and may suppurate, while there may be small hemorrhages under the skin.

There are three main varieties of plague—*bubonic*, wtih the characteristic glandular swellings; *septicaemic*, a very fatal type, in which the symptoms are more severe than in bubonic, without the glandular swellings; *pneumonic*, in which there is an inflammatory condition of the lungs, resembling pneumonia, with intense prostration, no glandular swellings, and usually death about the second or third day.

The only treatment is to treat symptoms as they arise—*e.g.*, headache or delirium—while alcohol and other stimulants may be given to keep up strength of the heart. An antitoxin, termed the Yersin-Roux serum, is of great benefit when employed within twenty-four hours of the commencement of the disease, very large doses being injected. As a preventive measure, inoculation with Haffkine's fluid, which is prepared from the sterilized virus of plague, has been proved to be of the greatest value, and is systematically carried out by the Indian Government. It has been shown that infection is carried by the fleas which have their habitat on the bodies of rats, and fleas also convey infection from one human being to another. This, in conjunction with the well-known fact that an unhealthy and filthy environment favors the disease, shows that the best preventive of plague is a clean and hygienic mode of living.

PLAICE (*Pleuronectes platessa*), a valuable flat fish. The mouth is small, the scales smooth and minute; the color above varies from brown to black with bright red or orange spots, and is white beneath. The eyes are on the right side. The lateral line is nearly straight. The average weight is about 3 lbs., and though 15 in. is about the average length.

PLAIN, a geographical term applied to a level surface of land at a low elevation from the sea. Extensive tracts of level land at a high altitude are usually called *plateaux* or *table-lands*, but in certain cases, such as the Ps. east of the Rockies, where the elevation from sea-

level to a great height is gradual, the term *plain* is retained. The most characteristic Ps. are those which extend over the basin of a large river, and are caused by erosion and deposition.

PLAINFIELD, a city of Connecticut, in Wyndham co. It is on the New York, New Haven and Hartford Railroad, and on the Quinebaug and Moosup rivers. Its industries include cotton and woolen mills, yarn factories, and foundries. It has a public library and is the seat of Plainfield Academy, one of the oldest educational institutions of the kind in New England. Pop. 1920, 7,926.

PLAINFIELD, a city of New Jersey, in Union co. It is on the Central of New Jersey Railroad, and is chiefly a suburban place of residence for business men of New York. Its industries include the manufacture of hats, clothing, silk and cotton goods, machinery, printing presses, etc. It has a hospital and a public library. Pop. 1920, 27,700.

PLAIN-SONG, PLAIN-CHANT, a style of ecclesiastical music, unisonous, corresponding to Gregorian song; so called since, in the course of centuries, its former rhythmical motion was lost, and it became stiffened into a monotonous succession of notes of equal length.

PLANCHETTE, a heart-shaped piece of this wood mounted on two castors, and having a pencil at the thin end so that it can move smoothly and easily upon them. It is used as a supposed medium for spiritual communications which the pencil gives in writing when the hands of those desiring the communication are resting upon it.

PLANE. See GEOMETRY.

PLANE (*Platanus*), genus of trees, order Platanaceae; P. *orientalis*, a native of the East, and Buttonwood, or N. Amer. Plane (*P. occidentalis*), are common; in Scotland the Sycamore (*Acer pseudoplatanus*) is called a p. (see MAPLE); p's are unaffected by smoke, hence their abundance in cities.

PLANEMETER. See CALCULATING MACHINES.

PLANET (*Gr. planetes*, 'a wanderer'), name given to eight celestial bodies revolving in same direction around sun by gravity, and known collectively as the SOLAR SYSTEM, and called planets because of their apparent wanderings among the fixed stars.

A planet may be distinguished by (*a*) this movement, or (*b*) its steady 'glare,' for unlike the stars planets very seldom twinkle, except when low in sky and thus near horizon vapors; and (*c*) telescopically by the fact that they show an appreciable disk, whilst even in the largest telescopes the stars are seen only as points of light, owing to their extreme distances.

The planets are divided into two groups, *major* and *minor*, and sometimes the four major planets nearest to the sun are called the Inner planets and the other four the Outer planets.

The major planets are (in order of distance from sun, commencing with nearest) Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.

All planets shine by reflected light, but probably both Jupiter and Saturn have some inherent luminosity.

PLANKTON, the medley of marine animals and plants which, incapable of active movement, drift with the surrounding water. Its importance lies in furnishing the basis of the food supply of all the animals in the sea.

The p. consists of three types of ingredients. (1) Most important in point of numbers and significance are the microscopically minute *vegetable organisms*—Bacteria, Diatoms, and Blue-Green Algae (*Cyanophyceae*). (2) A PERMANENT ZOO-PLANKTON, formed of *animal organisms* which spend their whole life in the waters. Jelly-Fishes, Sea-Blebs (Ctenophores), etc.; the Arrow-Worms (*Sagitta, Spadella*), and a few Chaetopods (*Tomopteris, Choetopterus*); countless hosts of minute Crustaceans, chiefly Copepods; and, amongst Vertebrates, the Sea-Squirts (*Salpoe*). (3) A TEMPORARY ZOO-PLANKTON, constituted by the early stages of animals which when adult live on the bottom or swim freely—for example, the larvae of Zoophytes and Corals, of Star-Fishes and Sea-Urchins, of Molluses, Worms, and Crustacea, and the eggs and larvae of Fishes.

PLANT, MORTON F. (1852-1918), Financier. *b.* in New Haven, Connecticut, and educated at a military school in the same place. Started in business 1868 with a southern express company. With the Plant System of railroads from 1884 and was vice president until 1902 when the system merged with another railroad of which he became a director. Was trustee and director of various banks and railroads.

PLANTAGENET, nickname of Geoffrey, Count of Anjou, who wore as badge sprig of broom (*Planta genesta*); applied to his Eng. descendants; Richard, Duke of York, *f.* of Edward IV., adopted this surname; last P. was Edward, Earl of Warwick, grandson of Edward IV., executed 1499.

PLANTAIN (*Plantago*), plant of order Plantaginaceae; Greater P. (*P. major*),

a common wayside plant, has long spikes whose seeds are given to cage-birds.

PLANTIN-CHRISTOPHE (1514-89). Fr. printer; settled in Antwerp, established printing-presses there, and became distinguished for the excellence of workmanship. His office in Antwerp, bought by the city in 1876, survives as the 'Musée Plantin.'

PLANTS. All living things are divided by common consent into two kingdoms, the *animal* and the *vegetable*. These are separated from each other by two main distinctions; the plant is not capable of free locomotion, and possesses green coloring matter. Neither of these distinctions is anything like universally true. Many plants and parts of plants can move freely, and whole classes of plants possess no green pigment. But it is true that in the vegetable there is a *tendency* towards these two properties; and those plants which depart from this tendency may be recognized as plants because of their near resemblance in other points to forms undoubtedly vegetable.

As a living thing a plant possesses a certain *form*, a certain *structure*, and performs certain *functions*. The study of form is termed *morphology*: of structure, *anatomy*; and of functions, *physiology*. These three branches of study have in the course of time given subsidiary branches, such as *cytology*, which deals with the structure of the cell, and *palaeontology*, which treats of the form, structure, and classification of fossil plants, and others which will be mentioned in their proper connection.

Morphology—If we examine any common weed we observe that it may be devided into a *root system* and a *shoot system*. The root system occurs characteristically underground, and is usuually much branched. There may be present one large tap-root, which gives off side-roots—*e.g.*, plantain; or there may be a bunch of more or less equal roots also giving off side-roots—*e.g.*, grasses. The roots traverse a large volume of soil and fix the plant firmly in position; but they also serve to absorb moisture, and this is accomplished by fine hairs which are found near the tips of the finest root branches, and which attach themselves firmly to the soil particles. The tip of the root is protected by a little cap. Roots do not, however, always remain of the typical fibrous form. Very frequently they become swollen up and serve as stores of food—the most important examples of this being the carrot and turnip.

The *shoot system* is readily divided into two classes of organs—the stem and branches, and the leaves. The leaves are the part of the plant in which food is built up, and to carry out their functions properly it is necessary that they should spread a large area out to the light. This the form of the typical leaf aims at: it has a thin blade with a large area, and is frequently held out from the stem on a special stalk. The leaves also are frequently modified to suit other ends. Thus the bulbs of hyacinth and onion are nothing but collections of leaves which have become much thickened, lost their green color, and have taken to storing food instead of manufacturing it. Many leaves are thin and brown—*e.g.*, tho scales which protect delicate buds. Most important modification of all is that which is seen in the *flower*. The outer circle of the leaves which compose the flower is protective in function, and is named the *calyx* (separate parts are the *sepals*); the second circle is generally brightly colored, and may have associated with it scent of honey glands; it is named the *corolla* (composed of *petals*), and serves to attract insects; inside the corolla are two sets of organs, the *stamens* and the *carpels*, also modified leaves, but bearing, the one *pollen-sacs*, the other *ovules*. The pollen-sac and the ovule are not modified leaves; they are special organs known as *sporangia*, whose special duty is to produce *spores*, with which we shall deal later.

The *stem* has as its function the holding of the leaves and flowers in an advantageous position; to this end it is typically rigid, or else suited to twisting itself around or otherwise fastening itself to an external support. It may, however, under certain conditions, take on the functions of a leaf; this takes place when for some reason the leaves are much reduced in size; thus in the common broom leaves are almost absent, and the stem becomes green and winged, and so increases the surface which it exposes to the light. The stem, too. may become thickened and form a food store; especially is this the case in underground stema (distinguished from roots by the fact that they bear buds which give rise to shoot systems), as in the potato.

The surface of stem and leaves is frequently set with hairs, prickles, and spines, which are mere surface excrescences, or may be modified branches or leaves.

Anatomy or Phytotomy—When we examine with the microscope a thin slice of a very young part of a plant, we find that it is built up of a mass of little boxes closely united together and known as *cells*. The study of the structure of these cells is called *cytology*. It is found that they consist of a wall (made of *cellulose*, a substance seen almost pure in

cotton wool), lining which is a layer of viscous, half-fluid substance, called the *cytoplasm*; this, together with a more solid, round object, the *nucleus*, which is embedded in it, is the actual living substance of the plant (*protoplasm*). Various other bodies are found embedded in the cytoplasm, of which in the plant the most important are the *chloroplasts*, which contain the green coloring matter, *chlorophyll*. Inside the cytoplasm is a watery fluid containing various salts and other substances dissolved in it—the *cell-sap*.

All cells of the plant do not, however, remain in this state; if we examine older parts, we find that many of the cells have taken on quite different shapes and properties in order to perform different functions. One important requirement of many parts is mechanical strength, and this is attained generally by the thickening of the walls of the cells, which thickening may or may not be accompanied by a deposition in the wall of substances which change it into *wood*. At the same time these strengthening cells generally lose their contents and thus die, and elongate greatly, taking on the character of fibres. Another important function which must be carried out by the cells is the carriage of water and food substances. This is most easy if the cells are very long, and consequently we find that the water-conducting cells are greatly elongated, and very frequently that the end walls separating them disappear, so that the water can traverse tubes consisting of rows of cells joined end to end. Such cells are also dead, and have thickened walls which serve to strengthen the plant. The cells which are used for conducting food are also long and wide, and the end walls between are pierced by small pores, to allow of the more ready passage of the contents.

These different types of cells are not scattered at random through the plant, but are arranged in definite groups called *tissues*. Thus the water-conducting cells and vessels are grouped together as *wood*, the food conductors form the *bast*, strengthening cells form the *stereome*. These tissues are also arranged definitely in the different organs of the plant. As an example we may take the young stem of a plant such as the sunflower. To the outside we have a tissue consisting of a single layer of cells extending over the whole surface and known as the *epiderm*; inside this we have a broad layer of ground tissue, the *cortex*. Then comes a ring of bundles—the so-called *fibro-vascular bundles*—each of which has a group of wood cells inside and of bast cells outside; inside the ring of bundles is a central core of ground tissue, the *pith*. If we examine an older stem we would find that certain changes had occurred: there would be a complete ring of wood surrounded by a complete ring of bast—or at least the rings would be broken only by slender spokes, the *medullary rays*, connecting the pith with the cortex. This change has occurred because a single circle of cells running between the wood and bast has remained in an actively growing condition, and has given rise to new wood and bast; this growing layer is called the *cambium*, and is responsible for the increase in thickness, shown by many stems—of trees, for example.

The arrangement of the tissues varies greatly in different organs—roots, stems, leaves—and in different plants. In the simpler forms of vegetation not all the kinds of tissue described are found. Thus in the mosses it is impossible to distinguish true water-conducting vessels; and at the same time the mosses possess no true root. In plants like the seaweeds and their relatives the structure is still simpler—leaves, stem, root are all absent; we are left with a simple, or branched, more or less strap-like body, which is named a *thallus*; it consists of cells which may take on different shapes, but which are far less distinct in form and function than are those of the higher plants. In still simpler forms we find that the plant consists of a simple row of cells joined end to end, or may even be reduced to one single cell—*e.g.*, the bacteria.

This tracing of similarities and dissimilarities between different members of the vegetable kingdom is known as *comparative morphology* or *anatomy*, and on the basis of such comparative studies is built up the system in which plants are classified.

The system is, however, largely based on the difference in the method of reproduction—one of the plant's *functions*—so that its study comes under the head of physiology.

Physiology studies the way in which plant lives—*i.e.*, the different functions of the plant: (1) growth and reproduction, (2) nutrition, (3) movement.

The actual operation of growth consists of two distinct processes; one is the enlargement of the individual cells, due either to an increase of living substance or of cell-sap; the other is the division of the cell into two halves, a process which is carried out with great nicety. The rate of growth and the form which a plant assumes are influenced greatly by external conditions. Thus heat increases rate of growth, as does also moisture. A prime necessity is the presence of oxygen. Particularly light and water are efficacious in altering the

form of a plant; many water plants produce one type of leaf in the water and another in the air; leaves grown in the shade are larger and of a finer texture than those from sunny positions. Growth ultimately brings the plant to a stage at which it sets about reproducing its kind.

Reproduction may be very simple: in the bacteria is consists simply in one cell dividing into two new ones. In the seaweeds and their relatives we have, however, a more complicated state of affairs; here we have special cells set aside for reproduction; they are termed *spores*, and may be of the most diverse design. For our purpose we may divide them into two classes: (*a*) *asexual spores* (usually spoken of simply as *spores*), which can germinate directly and produce a new plant; (*b*) *sexual spores* or *gametes*, which can germinate only after two have fused together and formed a completely homogeneous starting-point for the new organism. In many cases the spores and the gametes are produced by the same plant in response to different external conditions; but in some it is found that one plant will only give rise to spores, and that these spores give origin to a plant which produces only gametes, which give rise to a spore-bearing plant and so on. The two plants may be morphologically exactly alike, or they may differ the one from the other.

From reproduction, turn to the *classification* of plants. The arranging of plants in a system of groups, each of which contains forms more nearly related to each other than to those of other groups, has a practical interest only when it is recognized that one type of plant has *evolved* from another ancestral type—*i.e.*, that an actual 'blood' relationship between different forms exists. Plants are divided into four main groups. The first contains the seaweed-like forms, or *algae*, and the *fungi*—toadstools, etc., which differ from the algae by their lack of chlorophyll. These are distinguished by their simplicity of structure: there is no differentiation into leaves, stem, and root. An alternation of generations is frequently not to be observed. The *mosses* and *liverworts* are more complex, and many have distinct stems and leaves. All have typical alternation of generations, the gametophyte predominating. The *ferns*, and their allies the *club mosses* and *horse-tails*, have distinct roots and vascular systems, and are distinguished from the highest plants —*cone-bearers* (Gymnosperms) and *flowering plants* (Angiosperms)— by the fact that the latter produce seeds. In flowering plants and ferns the sporophyte is best developed. The study of fossil plants—*palaeontology*—has shown that many plants formerly existed which bridged the gaps now existing between the four great groups.

Movement in plants is chiefly carried on under the direction of external stimuli, with the object of obtaining suitable conditions of growth. Thus, under the influence If gravity roots move down into the earth; under the influence of light leaves turn so as to obtain a suitable light supply.

Ecology is a recent development of botany which aims at studying the way in which plants are related to their environment. In this way associations of plants are recognized from their similar habitat—*e.gl*, aquatic plants (Hydrophytes), moisture-loving plants (Hygrophytes), drought-loving plants (Xerophytes), and an intermediate class known as Mesophytes, to which the majority of the plants in this country may be referred. Other plant associations may be formed in which opposite requirements are complementary, as in the case of shade-bearing plants in the shelter of light-seeking plants. *Plant pathology* is economically important in that it studies the cause and cure of plant diseases. (See BOTANY.)

PLASTER CEMENTS. (See CEMENTS.)

PLASTER OF PARIS CEMENT. See CEMENT.

PLASTER CEMENT. See CEMENT.

PLASTER WORK is of ancient origin, and in some cases, as in the Pyramids, it has survived in good condition for thousands of years. The Greeks brought the art to great perfection, and used it in their temples. At a much later period P. was used in England for ornamenting mansions, and the decorated P. ceilings of Tudor times are specially fine. The extensive use of P. for small houses probably does not date back much more than a century. The composition of P. varies, but generally a mixture of Portland cement or lime with sand is used, ox-hair, sometimes horse-hair or goat's hair, being added to bind the mixture. Instead of hair, Manilla hemp fibre or sawdust may be used, the latter being employed also as a substitute for sand. Colors are obtained by color-washes or by mixing certain oxides with the lime.

PLATA, RIO DE LA, RIVER PLATE (35° S., 57° W.), wide estuary on E. Coast of S. America, between Uruguay on N. and Argentine on S., formed by junction of Paraná and Uruguay Rivers; *c.* 200 miles long, 25 miles wide at head, and 135 miles at mouth; through tributaries it drains vast area, including por-

tions of Brazil, Argentine, Uruguay, Bolivia, and whole of Paraguay; shores of Uruguay on N. are lofty and rocky, and those of Argentine on S. low and flat; estuary of great commercial importance, but navigation is hampered by extreme shallowness; Paraná, longer of two rivers, enters estuary by 11 outlets, largest being Paranáquazu and Paraná de Las Palmas. Chief ports are Buenos Ayres in Argentine, and Montevideo in Uurguay. Estuary was discovered by de Solis, in 1516, and explored by Magellan, in 1520.

PLATÆA, PLATÆÆ (38° 13′ N., 23° 16′ E.), ruined city, Boeotia, Greece; situated on Mt. Citharon; walls and portion of citadel remain; near here Persians were defeated by Greeks, 479 B.C.; destroyed by Spartans, 427 B.C.; by Thebes, 375 B.C.; finally restored, 330 B.C.

PLATEAU, an elevated tract of level or slightly undulating tableland.

PLATEN-HALLERMUND, AUGUST GRAF VON (1796-1835), Ger. poet and dramatist; *b.* Ansbach; studied Würzburg; best works, *Ghaselen* (Oriental poems), *Sonette aus Venedig*; *Die Abbasiden* (epic), and plays, *Der Romantische Odipus*, etc.

PLATES, BOOK. See Book Plates.

PLATINUM METALS.—A group of rare metals, including Platinum, Iridium, Osmium, Palladium, Rhodium, and Ruthenium. They are found either in the free metallic state, or as alloys, in gravels and sands, in various parts of the world, but principally in Russia, California, Australia, and S. America. Osmiridium is a naturally occurring alloy consisting of 10 per cent platinum, 52 per cent iridium, 1.5 per cent rhodium, 27.5 per cent osmium, 6 per cent ruthenium, and traces of palladium, copper, and iron. The metals are of a silvery color, melt at a very high temperature, and, with the exception of osmium, are not affected, chemically, by heating in air. Osmium when strongly heated is oxidized to the tetroxide, OsO_4. The metals, as a class, are distinguisheed by a remarkable resistance to the action of strong acids. Palladium is dissolved by strong nitric acid, but none of the others is affected. Aqua regia attacks both asmium and platinum, and, to a lesser degree, ruthenium, but iridium and rhodium are practically resistant to attack. These properties render the metals exceedingly valuable for any purpose where resistance to corrosion by air or chemicals is required, and the only factor which prevents their extended use is their scarcity and consequent high cost. They do find a wide use in small quantities, all of them being employed for the preparation of special alloys. Platinum utensils form a necessary part of any well-equipped chemical laboratory, and platinum points are used on spark plugs and other electrical equipment. Gold pens are frequently pointed with iridium and palladium is used in watches, for the manufacture of lancets, and as a catalyst in various chemical reactions.

PLATO (*c.* 427 B.C.-347 B.C.), Gr. philosopher; at the age of twenty he made the acquaintance of Socrates, and thenceforward devoted himself to philosophy. After death of Socrates he travelled widely, and probably visited Italy and Sicily. When about forty years old he began to teach and write in Athens, where he remained till his death, except for two journeys to Syracuse, the first of which took place in 368 B.C., on the death of Dionysius, and the second visit a few years later.

All Plato's philosophical writings have been preserved. They are cast in the form of dialogues, in most of which Socrates is represented as the chief speaker. In order of composition the slighter, so-called *Socratic*, dialogues undoubtedly come first, such as the *Laches* and the *Crito*; they were followed probably by the *Protagoras*, *Gorgias*, and *Meno*, and then by the first set of great constructive dialogues: the *Symposium*, *Phoedo*, *Republic*, and *Phoedrus*. Then come four dialogues in which logical outweighs ethical interest: the *Theoetetus*, *Parmenides*, *Sophist*, and *Politicus* or *Statesman*; then the *Timoeus* and *Philebus*, and last of all, the *Laws*.

Plato agrees with Socrates that to impart knowledge is impossible, and in two dialogues he represents the process of learning as 'reminiscence' (or 'recollection') of knowledge gained in a state of existence before bodily birth. He consistently maintains that the life of the soul neither begins nor ends with the body. In several dialogues we find the notion of transmigration, the soul passing at its next birth into the body of man, or some other animal whose character is like its own.

Certain statements of Aristotle's are usually taken to imply that, in his later oral teaching, Plato represented his Ideal Theory in a more mathematical form, and this is certainly true of the earliest successors to the leadership of his school, known as the *Academy*. For a time its interests were chiefly mathematical and scientific; later, it developed a critical and even sceptical tendency.

Neo-Platonism.—Far more important, however, than the Academy, is the *Neo-Platonic* movement of 3rd to 5th centur-

ies A.D., the final effort of philosophy. Its greatest name is Plotinus (*c.* 204-*c.* 264). Central in his doctrine is his conception of God, the absolute and perfect One, superior to all positive statements that we can attempt. Of the later members of the school the most famous are Porphyry, Iamblichus, Hypatia, and Proclus.

PLATONIC LOVE, spiritual affection between the sexes.

PLATT, THOMAS COLLIER (1833-1910), American politician and U. S. Senator; *b.* in Owego, Tioga co., New York, July 15, 1833; *d.* in New York, March 6, 1910. He entered Yale College, in 1849, but was forced by ill health to leave before completing the college course. Starting in business in Owego, he was president of the Tioga National Bank when established, in 1865. He became secretary and general manager of the United States Express Company, in 1879, and its president, in 1880. His first public office was clerk of Tioga co., 1859-1861, and he acquired control of the district while at the same time backing Roscoe Conkling's political aspirations. He was elected to Congress, 1872-1874, member of the United States senate, January, 1881, resigning with Roscoe Conkling, in May, owing to a quarrel with President Garfield, who refused them complete control of New York appointments. Platt and Conkling sought re-election, but Platt withdrew before the contest was decided. He was a member of the Board of the Quarantine Commission, 1880, and its president, 1884-1888; delegate to the National Republican Convention, 1884; he became the Republican leader of New York state, finding his reward in the power it gave him, for he never tried to make money out of his leadership, or asked for an office. He was elected to the U.S. Senate, in 1896, and re-elected, 1902-1908. In 1896, it was through his insistence that a firm declaration in favor of a gold standard was made a part of the Republican policy. In 1900, he arranged that Theodore Roosevelt should be nominated for Vice-President. His success as a political leader was owing to his deep knowledge of men, and of the intricacies of the political game.

PLATTE RIVER, formed by the North Fork and the South Fork, the former rising in North Park, and the latter in South Park, Colo., and uniting in Lincoln co., in Nebraska, thence flowing easterly across Nebraska, joining the Missouri River near the border of Iowa, 15 miles below Omaha. Its total length is 1,600 miles, and it averages from one to three miles in width, but is too shallow for navigation.

PLATTSBURG, a village in New York, the county seat of Clinton co., situated about 160 miles N. of Albany, on the shore of Lake Champlain, at the mouth of the Saranac River, and on the Delaware & Hudson and the Chateaugay railroads. It was settled in 1784. The U.S. Government has here a military post and reservation comprising 679 acres. During the early part of the war against Germany, a training camp for officers was established here. Pop., 1920, 10,909.

PLATTSBURG TRAINING CAMPS, cantonment at Plattsburg, N.Y., on the shores of Lake Champlain, at which military training was given prior to and during the World War to those who aspired to be officers in the United States army. The 'Plattsburg Idea' had its inception in the mind of Major General Leonard Wood, in 1913. He conceived of a camp to which high school and college boys could go for a few weeks in summer and be instructed in elementary military exercises as a part of the general movement toward preparedness, though no war at that time threatened. The camp grew rapidly, and, in 1915, following the sinking of the Lusitania its scope was enlarged so as to include professional and business men, this element numbering 1,200 in July of that year, while at a succeeding session in September, 600 were in attendance. When war against Germany was declared, 1917, Plattsburg, among other places, was selected by the Government for the training of officers. At the opening of the first camp, in May, Plattsburg had approximately 6,000 men who were being drilled for officers' positions of the Regular Army. The period of training was about three months and one other session was headed in the fall of 1917. In 1918, the Plattsburg Barracks was the principal center for the development of the S.A.T.C. (Students Army Training Corps), composed of officer material drawn from the colleges and universities of the country. The close of the war halted training, and the post was converted into a general hospital for the salvaging of the human wreckage of the war. Since that time the Plattsburg camp has been used during the summer for citizens military training, the recruits being drawn from colleges in the Eastern and Middle states.

PLATYELMIA, a subdivision of the animal kingdom and a group of flat' wormlike animals, including forms having more or less flattened oval bodies with distinct segmentations; of widely

varying forms and habits; generally divided into three classes; Planarians, Cestodes (tape- or ribbon-worms), and Trematodes (flukes). Latter two are parasitic.

PLATYTHELMINTHES, FLAT-WORMS.—Worms, generally with a flattened body, the majority of which occur as parasites within other animals, although some are found living independently in water or on land.

PLAUEN (50° 26′ N., 12° 7′ E.), town, on White Elster, Saxony; cotton goods. Pop., 1920, 104,918.

PLAUTUS, T. MACCIUS (*c.*250-184 B.C.), Rom. comic poet and dramatist; *b.* Sarsina, Umbria; pioneer of Rom. lit. Of the numerous comedies attributed to him, 31 are probably genuine; we possess 20 whole plays and numerous fragments. P. borrowed plots from Gk. New Comedy, and adapted them to suit Rom. audience; uses familiar New Comedy characters—roguish slave, parasite, etc.; imitated by many writers, including Shakespeare and Dryden. Most famous plays are *Aulularia*, *Captivi*, and *Menocchml.*

PLAYFAIR, JOHN (1748-1819), Scot. mathematician; *b.* Forfarshire; studied at St. Andrews; prof. of Natural Philosophy, Edinburgh, 1805. Pub. *Elements of Euclid*, *Outlines of Natural Philosophy*, besides important papers.

PLAYFAIR OF ST. ANDREWS, LYON PLAYFAIR, BARON (1818-98), Liberal statesman; P.C. 1873; Postmaster-General, 1873-74; pres. of Commission which made report on Civil Service, 1874; Chairman of Ways and Means, etc., 1880-83.

PLAYGROUNDS AND RECREATION CENTERS.—A modern urban movement for providing recreational facilities for children to keep them off the streets. It has received its chief impetus from the Playground and Recreation Association of America, organized in 1906, which helps American communities to establish municipal recreation systems for use the year around by sending its representatives over the country where needed to plan such work and obtain municipal appropriations therefor. Boston was early in the field by establishing an outdoor gymnasium, in 1886, and New York City later opened thirty playgrounds under the Board of Education. Numerous municipalities have since developed recreation centers. The movement is directed towards the use of school grounds after school hours and the provision of municipal or park areas in charge of a physical director. Some playgrounds have gardens (the caring for which attract children as a recreation), and are provided with toys and other playthings. For older children the scheme embraces the provision of swings, parallel bars, see-saws, and other devices for amusing them, while extensive municipal grounds may contain a running track, swimming pool, tennis court, and like facilities for sports and pastimes.

PLAYING CARDS. See CARDS.

PLAYS. See DRAMA

PLEBEIANS. See ROME (HISTORY); PATRICIAN.

PLEBISCITE.—A plebiscite was originally a term used in anc. Rome to denote a resolution of the *plebs* or commons formally passed at their regular assembly, the *Concilium Plebis*. At first such resolutions were only binding on the plebeians themselves; but after 287 B.C., by a law of Hortensius, such resolutions, though not laws, were equally binding on all Roman citizens, and, in fact, most important measures were thus carried. See also REFERENDUM.

PLEIADES (Gk. myth), seven sisters of Hyades; pursued by Orion, they besought Zeus for help and he changed them into stars; situated in constellation Taurus, the P. are the most famous star cluster in the heavens.

PLEISTOCENE (Gk. *pleistos*, 'most'; *kainos*, 'recent'), in geology, the lowest division of Post-Tertiary formation, in which most of the fossil remains belong to existing species, although those of P. mammals contain a few extinct forms. Also known as *Glacial* and *Drift* period, owing to number of icebergs then.

PLESIOSAURUS (near, lizard), the chief genus of the extinct family Plesiosauridae. The species were sea-reptiles with paddle-shaped limbs adapted for swimming, a very long neck containing from twenty-eight to forty vertebrae, a smallish head, and a short tail with from thirty to forty vertebrae. Fossil species have been found in the Lias of England and Germany.

PLETHORA, a condition of the body characterised by excess of blood in the vessels. It is shown by redness of face, a feeling of fullness in the head, and a general drowsiness. Some people are constitutionally plethoric, and the condition is brought about in others by good feeding combined with a neglect of exercise, diet, etc. There is often a tendency to bleeding at the nose, which should not be discouraged if the haemorrhage is not excessive.

PLEURA. See RESPIRATORY SYSTEM.

PLEURISY, inflammation of the *pleura,* or lining membrane of the lung cavity, caused by certain specific organisms. The chief varieties of P. are *dry P.,*in which there is inflammation of the pleura with a fibrinous exudation of lymph, tending to form adhesions, and *P. with effusion,* when an effusion of fluid varying in amount up to a gallon takes place after the inflammation. The onset is usually quite sudden, with a stitch-like pain in the side, increased on taking a deep breath, the patient has a dry cough, and the temperature may rise to 100° or a little over. In *P.* with effusion, the pain gradually becomes less, the patient feels uncomfortable and has difficulty, because of the weight of the fluid, in lying on the unaffected side. Characteristic physical signs can be made out in both varieties on careful examination by a physician.

PLEURO-PNEUMONIA, a specific, highly-contagious disease prevalent amongst cattle in U.S.A., Europe, S. Africa, and Australia. It affects the pleura and lungs, the latter finally becoming consolidated, and causes enormous loss of life.

PLEVNA (43° 27′ N., 24° 35′ E.), town, on Tutchinitza, Bulgaria; here defence and final surrender of Osman Pasha took place during Russo-Turkish War, 1877; woolens, silks, wines, live stock. Pop. 27,800.

PLEXUS. See NERVOUS DISEASES.

PLIMSOLL, SAMUEL (1824-98), Eng. politician; secured the passing of the Merchant Shipping Act, 1876, by which a Brit. merchant ship is prevented from sailing if deemed unsafe by Board of Trade. All such vessels bear a *Plimsoll mark* on the sides (circle crossed by a line at the center), below which she must not sink when loaded.

PLINLIMMON, PLYNLIMMON (52° 28′ N., 3° 47′ W.), mountain, Wales, 2,465 feet.

PLINY.—(1) Caius Plinius Secundus, called 'elder' (*c.* 23-79 A.D.), Rom. writer; *b.* in N. Italy; ed. Rome; served in German campaign under Pomponius; became pleader, but retired to estate at Novum Comum (modern Como) and devoted himself to literature; most prolific writer; besides many treatises wrote *History of German Wars,* and brought up to date *History of Rome* by Aufidius Bassus (31 books). His *Historia Naturalis* shows encyclopaedic knowledge; though inexact scientifically, is of great use regarding nomenclature and popular contemporary ideas; shows more signs of painstaking compilation than of original research; procurator in Spain, 71; guardian of younger Pliny (*q.v.*); killed by eruption of Vesuvius. (2) Pliny, Caius Plinius Caecilius Secundus (61-*c.* 115 A.D.), called 'younger' in contradistinction to his uncle and father by adoption; *b.* Novum Comum; ed. in rhetoric under Quintilian; practised as pleader and endeavored to check prevailing system of bribery and flattery; military tribune in Syria, 83; consul, 100; friend of Trajan and Tacitus; his correspondence with emperor, during his propraetorship of Bithynia, 103-5, regarding treatment of Christians, indicates moderation and fairness; delicate in health; married twice; no issue. His *Letters,* in 10 books, are written in best Ciceronian style; chiefly valuable for glimpses of life of upper classes in Rome. During his year of consulship P. wrote panegyric on Trajan.

PLIOCENE (Gk. *pleion,* 'more,' *kainos.* 'recent'), in geol. the uppermost division of the Cainozoic or Tertiary strata, which was divided by Sir Chas. Lyell into four groups:Eocene, Miocene; Older and Newer Pliocene (or Pleistocene). Each is characterized by a different proportion of fossilized remains of existing species.

Life of the P. period included *Flora* ivy, maple, elm, magnolia, laurel, beech, poplar, and lime trees; and *Fauna*—mastodons, elephants, rhinoceri, horses, giraffes, bears, apes.

PLOCK, PLOTSK.—(1) (*c.* 52° 50′ N., 20° 50′ E.), province, Russ. Poland; area, 3,641 sq. miles; drained by Vistula and tributaries; produces grain. Pop. 700,000. (2) (52° 45′ N., 19° 40′ E.), town, capital of above, on Vistula; exports grain. Pop. 30,000.

PLOERMEL (47° 55′ N., 2° 23′ W.*B*, town, capital, Morbihan, France; slate quarries; trade in cloth. Pop., commune, 9,600.

PLOESCI, PLOYESHTI (44° 56′ N., 26° 14′ E.), town, capital Prahova, Roumania; petroleum refineries. Pop. 57,400.

PLOMBIÉRES (47° 58′ N., 6° 30′ E.), watering-place, department Vosges, France; mineral springs.

PLOTINUS. See PLATO (NEO-PLATONISM.

PLOVER FAMILY (*Charadriidae*). The Plovers are in general small, graceful birds, with long legs, usually partially webbed feet, and often long bills. They have long, pointed wings, are excellent fliers, and are so given to migration that at one part of the year or another every

land knows them. Most lay four spotted eggs in a simple nest or mere excavation on the ground. The true Plovers, with short bills and three or four toes, include the Golden Plover (*Charadrius*), the American Kill-Deer Plover (*Aegialitis*), the Dottrels (*Endromias*), the crested Green Plovers (*Hoplopterus*), all with three toes, and the four-toed and crested Common Lapwing or Peewit (Vanellus).

The members of another group possess long bills and four toes, of which at least two are united by a web; such are the Long-Legged Plovers or Stilts (*Himantopus*) and the Avocet (*Recurvirostra*), both with exceedingly long legs, the latter with an up-curved 18-inch long bill; the Curlews and Whimbrels (*Numenius*), with long down-curved bill; the thick-set short-legged Oyster-Catchers or Sea-Pies (*Haematopus*); the Sandpipers, with short, straight, hard-tipped beak, including the Common Sandpiper (*Totanus*), and the Ruff (*T. pugnax*), noted for its courtship dances, and so-called on account of the collar of feathers assumed by the male during the breeding season.

PLOW.—The P. is an implement made entirely of iron, and consisting of a *beam* to which are attached the *coulter*, a knife which makes the preliminary cut in the soil, the *share*, which separates the sod from the underlying soil, and the *mould-board*, which throws the sod over in such a way that its upper side is turned down. The function of ploughing is to turn over the sod and present a surface of free soil for sowing; at the same time it keeps the soil broken up and loose in texture. (See IMPLEMENTS, AGRICULTURAL.)

PLUCKER, JULIUS (1801-68), Ger. mathematician and physicist; *b.* Elberfeld; ed. Bonn, Heidelberg, Berlin, and Paris. Prof. of Math's, Halle, 1834; Bonn, 1836-47; prof. of Physics, Bonn, 1847-68.

PLUM (*Prunus domestica*), a Rosaceous tree cultivated for its fruit, and growing best on a somewhat calcareous, well-drained soil. The fruit is known technically as a drupe, and consists of a seed (kernel) enclosed by a stony endocarp, a juicy mesocarp, and a membranous epicarp.

PLUMBAGO. See CARBON, GRAPHITE.

PLUMER OF MESSINES (HERBERT CHARLES ONSLOW PLUMER), FIRST BARON (1857), Btir. soldier; entered the army in 1876; served in Sudan, 1884; being present at El Teb and Tamai; took part in operations in S. Africa, 1896, commanding a corps of mounted rifles under Sir Frederick Carrington; commanded Rhodesian column in S. African War, 1899-1902; was mentioned in dispatches in each campaign; promoted major-general, 1902, and lieutenant-general, 1908; has held various important commands, including the Northern, 1911-14. The World War greatly increased his reputation; he commanded 5th Army Corps in France, 1915, and 2nd Army, 1915-17, being promoted general, 1916. From Nov., 1917, to March, 1918, he commanded the Ital. Expeditionary Force, returning to France to resume command of 2nd Army, which he held till close of war. After commanding the Army of the Rhine for a time, he was appointed governor of Malta, 1919, and later in the same year was promoted field-marshal.

PLUMPTRE, EDWARD HAYES (1821-91), an English theologian and classical scholar. His prose works include *Biblical Studies, 1870*; *Movements in Religious Thought, 1879*; *The Spirits in Prison*. He also published poems: *Lazarus, 1864*; *Things New and Old, 1884*; verse translations of *Sophocles, 1865*; and Æschylus, *1868*, and of *Dante's Divina Commedia* and *Canzoniere, 1886-87*.

PLUNKET, OLIVER (1629-81), R.C. abp. of Armagh, 1669; executed at Tyburn, July 11.

PLUNKETT, SIR HORACE CURZON (1854), Irish politician; M.P., 1892-1900; founded Irish Agricultural Organization Soc., 1894; vice-president, Department of Agriculture and Technical Instruction for Ireland, 1899-1907; commissioner, Congested Districts Board; chairman, Irish Convention, 1917-18. He visited the United States in the interests of the Irish Free State, in 1923, and during his absence his house was burned by an Irish Republican mob. He has pub. *Ireland in the New Century, 1904*; *Noblesse Oblige*; *an Irish Rendering, 1908*; *The Rural Life Problem of the United States, 1910*; *Some Tendencies of Modern Medicine, 1913*; *A Better Way: an Appeal to Ulster not to Desert Ireland, 1914*.

PLURALISM, philosophical doctrine that reality consists of plurality of beings.

PLUSH (contraction from *peluche*, hairy fabric), a kind of cloth of silk, cotton, or wool, or a mixture of these, woven like velvet, but having a longer and softer nap. It is used chiefly for rich garments, trains, upholstery, and especially for footmen's knee-brechees and liveries. 'Hatter's P.' is used for the outside of top-hats.

PLUTARCH, PLOUTARCHOS (*c.* 46-120 A.D.), Gk. biographer; *b.* Chaeronea, Boeotia; ed. Athens; lectured on philosophy in Rome; honored by Trajan with consular rank, by Hadrian with procuratorship of Greece. P.'s best-known work is his *Parallel Lives*, in which he gives, side by side, biographies of celebrated Greeks and Romans, similar in character or circumstance, *e.g.*, the lives of Alexander the Great and Caesar form one book. Besides this, some sixty essays on various themes (such as *On the Education of Children*, *On the Genius of Socrates*) are grouped under the title of *Opera Moralia*.

PLUTO, HADES (classical myth), god of underworld; *s.* of Cronos; *bro.* of Zeus and Poseidon, with whom he divided the world; called Hades in early times; P. carried off Persephone, *dau.* of Demeter, judge of the dead.

PLYMOUTH (50° 22′ N., 4° 9′ W.), seaport, naval station, municipal, parliamentary, and county borough, Devonshire; situated at head of P. Sound, between estuaries of Plym and Tamar. Few traces of antiquity are left except citadel; town is well built, with many fine structures, including Guildhall, Municipal Buildings, Museum, Charles Church, St. Andrew's, R.C. Cathedral, and many educational establishments. At Stonehouse are Marine Barracks, Naval Victualling Yard, and Naval Hospital; Devonport contains important dockyards. Shipbuilding and fishing are chief industries; manufactures chemicals.

P. took prominent part in history; Pilgrim Fathers left here for America, 1620; among many famous men connected with town are Drake, Raleigh, Hawkins, and Grenville. Pop., 1921, 209,857.

PLYMOUTH, a town in Litchfield co., Conn. Its industries include lumbering and the manufacture of hardware, etc. Pop. 1920, 5,942.

PLYMOUTH, a town of Massachusetts, in Plymouth co., of which it is the county seat. It is on the New York, New Haven and Hartford Railroad, and on Plymouth Bay, 37 miles S.E. of Boston. Its chief industry is fishing. It has also manufactures of cordage, cotton, woolen and cotton goods, zinc, steel, and iron products. Plymouth is of great historical importance as being the spot on which the Pilgrim Fathers landed in December 21, 1620. A portion of the rock on which they first stepped is still preserved, and in Pilgrim Hall are many old books, paintings, pictures, and other relics. The 300th anniversary of the landing of the Pilgrims was celebrated in 1920 with elaborate ceremonies. There is a National Monument, over 80 feet high, erected to the Pilgrims. Pop., 1920, 13,045.

PLYMOUTH, a borough of Pennsylvania, in Luzerne co. It is on the Delaware, Lackawanna and Western Railroad, and on the Susquehanna River. It is the center of an extensive coal mining region. Its industries include the manufacturing of mining drill machinery, hosiery, silk, and lumber products. Pop., 1920, 16,500.

PLYMOUTH BROTHERS.—A Christian sect founded in Dublin, Ireland, by Rev. John W. Darby, of the Episcopal Church of Ireland. In 1830, he established the sect at Plymouth, England. It spread over the British dominion and among Protestant dissenters in France and Italy. Plymouth Brothers believe in the literal interpretation of the scriptures and the majority hold Pre-Millenarian views. Communion is held every Lord's Day, or first day of the week. Baptism is by immersion. There are no presiding officers, and anyone is privileged to speak in meetings which are 'Exclusive' or 'Open'. There is no ecclesiastical organization, and there are no churches, the meetings being held in halls, or private houses. There are about 12,000 members in the United States.

PLYMOUTH SOUND, an arm of the English Channel, between Devonshire and Cornwall, covering an area of 4500 acres, including the following inlets: the Catwater, Sutton Pool, Mill Bay, Stonehouse Pool, and the Hamoaze, the latter used as a naval harbor, and Cawsand Bay on the W. An immense breakwater, built at the cost of 1½ million sterling, was completed in 1841, and this shelters the harbors from the S. W. gales. It is nearly a mile long, and lies some 2½ m. to the S. of the Hoe. A lighthouse has been erected at the W. end, while at the opposite end is a beacon in the form of a pyramid furnished with a cage large enough to contain several men.

PLYMPTON (50° 23′ N., 4° 2′ W.), town, Devonshire, England, including villages of P. St. Mary and P. Earle; stannary town; has ruined castle and monastery; Reynold's birthplace. Pop. 5,000.

PNEUMATIC GUN, a gun which under pressure of expansive force of air discharges heavy explosives, or even projectiles loaded with high explosives.

PNEUMATIC TOOLS is the name given to mechanical appliances (usually portable) operated by compressed air.

The air is supplied to the tools by flexible tubes from the supply tanks. The motors used to drive the tools are self-contained and may be either of the percussion or rotary type. The former delivers to the tool a series of rapidly repeated blows such as is required for drilling through concrete or rock, riveting, caulking, chipping, stone cutting, etc. The mechanism is a piston and cylinder with suitable inlet and exhaust ports, the piston acting as a valve. The air, being admitted to the cylinder in a pulsating manner, acts on the piston, which in turn delivers blows to the tool. The tools for this class of machines are interchangeable, one with the other, so that one 'hammer,' as it is called, can be used with a number of tools. The hammer and tool is portable and when in operation is held firmly against the work by hand. Some hammers will deliver blows at the rate of 20,000 per minute. A modification of this tool is the 'valve hammer,' designed to deliver long strokes at the rate of approx. 2,500 per min. These are widely used for drilling rock, heavy riveting, etc. A rotary type motor is used to operate drills, taps, reamers, etc., for use in wood or metal, and for screwing in long screws, etc. The motor may be of the rotary or reciprocating type, the latter being more common, due to its greater economy of air. Other tools operated by compressed air are: hoists, jacks, 'bull dozer' press, rivet 'buster', paint and insecticide sprayers, sand blasting machines, cement gun (for applying cement to walls, etc.), shearing machines for sheep, horses, etc. Pneumatic tools were developed recently in the U.S. and are now widely used all over the world.

PNEUMATIC TUBES, transport of written documents through tubes by compressed air or vacuum. Chiefly used in post offices and for transmitting telegrams from central to suburban offices, or from one department to another in same building. The conveying pipe is of lead, about one and one-half inch to three inches in diameter, and the dispatches are contained in a case of rubber. Behind this, compressed air is admitted.

PNEUMATIC TIRE. See TIRE.

PNEUMATOLYSIS, the effects produced on masses of rock by the discharge of certain vapors from igneous rocks. Such vapors include carbonic acid, hydrogen, nitrogen, hydrochloric acid, and fluorine. P. is generally found most active in lava flows, and in such its action continues long after an eruption.

PNEUMATOMACHI (Gk. *Pneumatomachoi,* Strivers against the Spirit), sect of IV. and V. cent's which denied divinity of the Holy Spirit.

PNEUMONIA, inflammation of the lung tissue proper, due to specific micro-organisms, occurs in two forms, termed, according to the distribution of inflammation, lobar or croupous pneumonia and lobular or broncho-pneumonia. In *acute lobar* or *croupous pneumonia*, the air-cells are filled with a fibrinous exudate with blood corpuscles and epithelial cells, which coagulates, consolidating the lung.

The onset of an attack is sudden, there is headache and rigor, the temp. rising to 103° or 104°. About the seventh or eighth day the fever terminates by crisis, falling to normal in a few hours, accompanied by perspiration, and there is general improvement, the pulse and respiration becoming normal. The treatment of acute lobar pneumonia is absolute rest, plenty of fresh air, ice poultices over the chest to relieve pain, and to support the patient's strength by milk, soups, and similar light nourishment. Stimulants, of which strychnine and digitalis are the best, may be given if required. A vaccine treatment has been employed with some success.

Acute lobular or *broncho-pneumonia* comes on more gradually than the lobar form and runs a different course, while it is due to catarrhal inflammation of the small bronchi spreading to the neighboring air-cells. The fever is remittent, there is cough, difficulty in breathing, and a frothy sputum. The pulse is rapid. An attack is very frequently secondary to an acute infection (*e.g.*, measles, typhoid fever), or chronic debilitating conditions (*e.g.*, chronic heart disease or Bright's disease).

Chronic interstitial pneumonia is a rare condition, consisting in a localized or diffuse increase of the fibrous tissue of the lung, occurring in connection with occupations in which dust is habitually inhaled (*e.g.*, coal-miners, stone-masons, millers, jute workers), or after syphillis or repeated attacks of pleurisy. The symptoms resemble those of chronic phthisis, with progressive weakness and deficient expansion of the affected side, and the diagnosis is difficult.

PNOM-PENH (11° 40′ N., 104° 40′ E.), town, capital Cambodia, Fr. Indo-China, on Mekong; exports rice. Pop., 1920, 87,870.

PO (44° 55′ N., 12° 28′ E.), river, Italy; rises in Monte Viso; flows N.E. and E., through Piedmont and Lombardy, and entire Adriatic by numerous mouths; length over 400 miles; navigable from Casale Monferrato; chief

tributaries, Dora Riparlo, Ticino, Addo, Oglio, Sesia, Tanara.

POACHING. See GAME LAWS.

POCAHONTAS (*c.* 1595-1617), an Indian woman, noted in the colonial history of Virginia, *dau.* of Powhatan, an Indian chief of Virginia. She is famous for Smith's story in his *General History of Virginia, 1624*, and *True Relation, 1608*. Argall lured her on board an English ship and held her as hostage. She was finally converted to Christianity and baptized as Rebeccah, 1613, and married John Rolfe, *c.* 1614, one of the Jamestown settlers, coming with him to England, 1616. John Randolph of Roanoke claimed descent from her.

POCATELLO, a city of Idaho, in Bannock co., of which it is the county seat. It is on the Oregon Short Line Railroad, and on Port Neuf River. It is the center of an extensive mining, stock raising, and agricultural region, and is the division headquarters of the Oregon Short Line Railroad. It is the seat of Idaho Technical Institute, and of the Holy Cross School. It has a public library and a Y.M.C.A. building. Pop., 1920, 15,001.

POCKET GOPHERS, POUCHED RATS (*Geomys* and *Thomomys*), small rodents with cheek-pouches, lined with hair, opening on the cheek outside the mouth. In this respect they resemble Pocket Mice (*Perognathus*) and Kangaroo Rat (*Dipodomys*), and all are American; but while the Gophers always live underground, the others are found on the surface.

POCOCK, SIR GEORGE (1706-92), Brit. admiral; *nephew* of George Byng; commander in the East Indies from 1757 to 1760; took Havana after protracted siege, 1762.

POCOCKE, EDWARD (1604-91), Eng. Orientalist, of remarkable erudition; chiefly distinguished for his works on Arabic subjects; first holder of Laud's Arabic Chair at Oxford (founded 1636).

POD, a long narrow dehiscent syncarpous fruit, such as the legume of the pea, siliqua of the wallflower, and follicle of the columbine.

PODESTA (Lat. *potesta*, power), Ital. official whose functions may range from the judicial to the supreme administrative and military.

PODGORITZA, PODGORICA (42° 27′ N., 19° 23′ E.), town, Montenegro, on Moraca; active trade; near remains of ancient Dioclea. Pop. 10,000.

PODOLIA, one of the most fertile of Russ. governments; situated in S.W. Russia. Area, *c.* 16,240 sq. miles; capital, Kamenetz-Podolsk; drained by Dneister and Bug. Pop. 3,800,000.

PODOLSK (55° 25′ N.; 37° 30′ E.), town, on Pakhra, Moscow, Russia; limestone quarries. Pop. 4,000.

PODOPHYLLIN, drug, consisting of a resin in yellowish-brown powder obtained from the root, or the powdered root itself, of the American May-apple (*Podophyllum peltatum*) of natural order *Berberidaceae*, with a bitter taste and disagreeable smell; used medicinally as a biliary stimulant and purgative, particularly in disorders of the liver.

POE, EDGAR ALLAN (1809-1849), American poet and story writer; *b.* in Boston, January 19, 1809; *d.* in Baltimore, October 7, 1849. His parents were actors. He was the second of three children, and at the time of his birth his mother was engaged at a Boston theatre. Orphaned at the age of three, he was adopted by his god-father, John Allan, of Richmond, Virginia. At the age of six, the Allans took him to England and placed him at school at Stoke-Newington, where he remained for six years. Returning to the United States, in 1821, he was prepared for college, and matriculated at the University of Virginia at 17. Having lived wildly, and incurred gambling debts at the university, Mr. Allan refused to allow him to return. He was a short time in Allan's counting-house and then ran away to Boston, where he published *Tamerlane* and *Other Poems, 1827*, his first book. Poor, and friendless, he joined the army and rose to be sergeant-major, and induced his godfather to have him entered at West Point. Hating discipline, he acted in such a manner as to secure his dismissal from the college. He now decided on a literary career and published a second edition of his poems, including *Israfel* and *To Helen*, in 1831. The story *Manuscript Found in a Bottle* won a prize offered by the *Saturday Visitor*. Moving to Richmond, he became editor of *The Southern Literary Messenger*, and in 1836 married his cousin, Virginia Clem, who inspired *Annabel Lee, Lenore*, and other poems. *The Raven* was written during his wife's serious illness. In 1838, he came to New York, was connected with the *Quarterly Review* for a time, and then went to Philadelphia as assistant editor of the *Gentleman's Magazine*. In 1839, appeared *Tales of the Grotesque and Arabesque*. He was next an editor on *Graham's Magazine*, in which *Murders of the Rue Morgue, Mystery of Marie Roget*, and others of his famous stories appeared. He was editor for a time of the

Broadway Journal, New York, which was not a success. In 1847, Mrs. Poe ruptured a blood vessel, and several years of want and misery followed, during which Poe wrote *The Bells*, *Ulalume*, and some of his finest poems. In October, 1849, while visiting Richmond, he was taken ill, and found delirious in the streets was removed to the City Hospital, where he died. He was buried in the grounds of Westminster Church. Of morbid nature, living in dreams, he was unfitted for life's struggle. A dipsomaniac, his excesses were greatly exaggerated by his enemies.

POERIO, ALESSANDRO (1802-48), Ital. patriot and poet; killed in battle for the liberation of Venice. His poems, often reprinted, contain some rousing songs of freedom.

POETRY.—Perhaps no definition has occasioned so much controversy and given so little satisfaction as the definition of poetry. The Greek tendency was to regard the matter or content as of prior importance, and this view is upheld by Aristotle in his *Poetics*, a magnificent treatise on the art of poetry. The Romans, on the other hand, tended to regard poetry as a mechanic art, and the *Ars Poetica* of Horace is mainly devoted to points affecting meter and diction. The Fr. school was for long trammelled by formalism, as is well illustrated by Boileau's treatise on Poetics. But no true understanding of poetry can be reached until form and content are regarded as complementary and not independent.

There are certain qualities that are characteristic of the highest poetry when regarded from the point of view of subject-matter, and among these the qualities of elevation and expansion stand conspicuous. Elevation is exhibited in divers ways, in sublime thoughts, sublime actions, and sublime forms. Expansion is manifest in wider sympathies, ecstatic emotions, and subliminal feeling. These characteristics explain why it is that imagination and symbolism are such potent factors in poetry; they are gates to elevation and expansion. Thus, too, are the religious, philosophic, and metaphysical tendencies of poetry explained. From the standpoint of form there are many adventitious accompaniments of poetry, but only one essential, and that recurrent *rhythm*. There are, indeed, prosodists who insist that meter is essential to poetry, but such a view would exclude the whole of Hebrew poetry, the whole of Teutonic poetry (Old German, Old English, and Icelandic), and much modern poetry classified as *vers libre*. The rhythm in poetry is marked in various ways. It may be restricted and systematized to form meter, or it may be given a loose rein and only marked by such devices as alliteration, parallelism, repetition, and rhyme.

Poetry was considered by the Greeks, and is still considered by most moderns, as an imitation of life, but it is probably better to say that it is an expression of life. But poetry cannot express life in all its aspects; it can only deal with life in its highest moods. In the case of humorous poetry, it is the incongruity between the subject and the manner of treatment that adds piquancy to the verse. If it be granted, then, that poetry can only properly deal with certain themes, we arrive at a truth enunciated by Coleridge, that poetry must employ a somewhat different vocabulary from prose. Wordsworth attempted to show that such a thing as a poetic diction was wholly unessential to poetry. But an examination of the works of any great poet will always show a difference in vocabulary between his works and those of any great prose writer of the period. The tendency of the poet is generally towards a somewhat more archaic form of expression, and in proportion to the greatness of his theme his language will rise above that of common life, and he will express himself in the 'grand style' which Matthew Arnold marked out as the supreme characteristic of the highest poetry.

Poetry in its embryonic state arises from religious worship, veneration of heroes, and instruction in conduct. This stage precedes the *ballad* stage, at which the veneration of heroes has reached a high degree of development. Succeeding the ballad stage is the age of the *epic*, where the various heroic ballads are woven into a unity round one central idea. *Didactic* poetry rises out of the old instruction verses. So far poetry has been purely objective in character; subjectivity and analysis of emotion belong to an advanced state of culture. Thus, *lyric*, a highly subjective form of verse, is posterior to the epic, and its complexity of thought has its counterpart in the complexity of the metrical scheme. Last of all is evolved the *drama*, with its balance of subjectivity and objectivity of psychology and action.

POGANY, WILLIE (WILLIAM ANDREW) (1882), artist; b. at Szeged, Hungary. Educated at the University of Budapest and at the Art School, Budapest, and also studied in Paris and Munich. In 1915, awarded gold medals at Leipzig, Panama, Philippine Island Exposition, and Budapest. Illustrator of many books. Member of a firm of theatrical producers and managers.

POGGENDORF, JOHANN CHRISTIAN (1796-1877), Ger. physicist; *b.* Hamburg; apothecary's assistant; prof. of Physics at Berlin; made valuable discoveries in electricity.

POGGIO BRACCIOLINI (1380-1459), Ital. scholar; *b.* Terranova, Florence; published a famous *Liber Facetiarum*, a collection of jests and anecdotes particularly directed against monastic life.

POGLIZZA (43° 30′ N., 16° 45′ E.), mountainous region, Dalmatia, Austria; formerly seat of a small republic.

POINCARÉ, JULES HENRI (1854-1912), Fr. mathematician and physicist; *b.* Nancy; prof. at Paris Univ. from 1886; publications include *Lecons sur la Theorie Mathematique de la Lumiere, 1888*; *Cours de Physique Mathematiguw*, (13 vols. 1890 *sqq.*); *Les Methodes Nouvelles de la Mecanique Celeste, 1892-9*); *La Theorie de Maxwell et les Oscillations Herziennes, 1899*; *Theorie du Potentiel Newtonien, 1899*; *La Science et l' Hypothese, 1903.*

POINCARÉ, RAYMOND (1860), Fr. statesman and member of Fr. Academy; *b.* Bar-le-Duc; educated at the College of Nancy; called to the bar, 1880, and pratised for a time as a lawyer in Paris; turned to politics, and wrote political articles for the *Voltaire* and the *Republique Francaise*; was elected to the Chamber of Deputies, 1887, and was minister of public instruction, 1893, and minister of finance, 1894 and 1906; was vice-president of the Chamber of Deputies, 1895-8; became a member of the senate, 1903, and premier of France, 1912, his term of office being marked by important Fr. initiatives in connection with the Near Eastern crisis; in 1913, was elected president of the republic, and held office till 1920; by his constancy and calm dignity did much to inspire confidence in the Fr. nation durin the World War; on the termination of his presidency joined the staff of the *Revue des Deux Mondes* as contributor of the political chronicle; for a time was president of the Reparations Commission, but resigned owing to disagreement with the Allied policy on that question. He became premier again in 1922. He took a firm stand in 1923 for the occupation of the Ruhr Valley by the French. (See RUHR, OCCUPATION OF.) His eloquent *Messages, Discours, Allocutions, Lettres et Telegrammes*, models of style, from the Armistice to the signing of the Peace Treaty, were pub. in 1920 (2 vols.).

POINDEXTER, MILES (1868), a United States senator; *b.* at Memphis; *s.* of William B. and Josephine Alexander Anderson Poindexter. He was educated at Fancy Hill Academy, and at Washington and Lee University. He removed to Walla Walla, Wash., in 1891, and the following year was elected prosecuting attorney of Walla Walla co. Five years later he located at Spokane, Wash., and was assistant prosecuting attorney of Spokane co., from 1898-1904, after which he was judge of the Superior Court until 1908, a member of the 61st Congress, 1909-11, 3rd Wash. Dist., and then was United States senator from Washington for two terms, 1911-23. He was appointed Ambassador to Peru, in 1923.

POINSETTA, or **EUPHORBIA** (*Pulcherrima*), a handsome greenhouse plant (order Euphorbiaceae), bearing brilliant scarlet, crimson, or white bracts in whorls. It is raised from cuttings inserted in a light compost in spring or late summer.

POISON, a substance which by internal or external use injures or destroys life; it may be local or general, acute or chronic; its effect may be modified by idiosyncrasy and by habit (*e.g.*, opium, arsenic, etc.).

Symptoms include derangement of circulatory, nervous, muscular, and digestive systems; the latter often accompanied by stomachic pains, vomiting, and diarrhoea.

Treatment embraces evacuation and cleansing of stomach, use of emetics (mustard, zinc, sulphate, ipecacuanha), and antidotes.

COMMON POISONS (*treatment in brackets*).

(1) *Corrosives*—Corrosive sublimate (white of egg). Mineral acids and oxalic acid (chalk, lime-water). Caustic alkalis (dilute vinegar, olive oil). Carbolic acid (emetic—weak alkali, white of egg—keep warm).

(2) *Irritants*—Arsenic (emetic—fresh-by precipitated ferric hydroxide—white of egg). Phosphorus (emetic—Fr. turpentine). Lead salts (emetic—Epsom salts). Copper salts (white of egg).

(3) *Neurotics*—Prussic acid, and the cyanides (emetic—artificial respiration). Opium and morphine (emetic—atropine subcutaneously—artificial respiration). Strychnine (emetic—Chloroform or chloral).

(4) *Gaseous poisons*—Chlorine, the poison gas introduced by the Germans during the World War, sulphur dioxide, oxides of nitrogen, ammonia, carbon monoxide, carbon dioxide, coal gas, hydrogen, chloroform vapor (plentiful respiration of air or oxygen).

(5) *Micro-organic poisons*—Ptomaines, toxines.

The evidence of poisoning in a dead body depends upon the characteristic

post-mortem appearances which certain poisons (*e.g.*, corrosives) cause in the alimentary canal and elsewhere; upon the results of the chemical analysis of the contents of the stomach and bowels and of other tissues; and upon the results of experiments upon animals with the substances obtained from the stomach, bowels, and other tissues, or with the suspected food.

There are certain circumstances which point to a case of poisoning, and upon which the evidence of poisoning in a living person largely depends: the suddenness of the onset of symptoms (although violent symptoms may come on very suddenly in certain diseases—*e.g.*, apoplexy), the fact that the symptoms usually follow the taking of food or drink, the finding of poison in the remains of food or drink, or in vomited matter from the affected person, suspicious conduct of individuals with easy access to the affected person—*e.g.*, nurse or relatives.

It is a felony to administer a poison or other destructive thing with intent to murder, or in order to overcome or stupefy a person for the purpose of committing an indictable offense, and a misdemeanor to administer a poison or other noxious thing with the purpose of injuring or annoying a person. Registered chemists and druggists, pharmaceutical chemists, or legally qualified apothecaries, veterinary surgeons, or dealers in patent medicines are alone permitted by law to sell or dispense poisons. By various state laws and acts, two groups of poisons are scheduled; those in Part I. are only allowed to be sold to persons known to, or introduced by persons known to, the seller, and the quantity of the poison sold, the purpose for which it is to be used, with the date and the name and address of the purchaser, must be entered in a register kept for the purpose; the name of the article, the word 'Poison,' and the name and address of the seller must be affixed to the box containing the poison. For those poisons included in Part II. no entry in the register is required, but on the box containing any of them must be affixed name of article, word 'Poison,' and name and address of the seller.

POISON GAS IN WARFARE. See ASPHYXIATING GAS.

POISON IVY, a climbing plant closely resembling the woodbine. It secretes an oil which is very irritating to sensitive skins and affects the sweat glands. Poison Ivy may be distinguished from woodbine from the fact that it has only three leaves on the twig, while the woodbine and other harmless vines have five. There are many remedies for Poison Ivy, but none can prevent the spread of the poison after it has once begun. A simple remedy is a weak solution of common baking soda and water.

POISSON, SIMEON DENIS (1781-1840), Fr. mathematician; *b.* Pithiviers, Loiret. Author of many important works on mathematics and mathematical physics, including various memoirs on celestial mechanics, theory of attraction, and especially the theory of electricity and magnetism; wrote *Traite de mecanique*, and *Theorie mathematique de la chaleur*.

POISSY, ancient *Pinciacum* (48° 56′ N., 2° 1′ E.), town, Seine-et-Oise, France, on Seine; distilleries. Pop. 8,000.

POISSY, COLLOQUY OF (1561); summoned by Catherine de' Medici to arrange service in which Catholics and Huguenots might join; utterly failed, and increased religious bitterness.

POITIERS (46° 34′ N., 0° 22′ E.); town, Vienne, France; gave name to countship from VIII. to XV. cent.; scene of battle, 1356, in which the Black Prince defeated King John II. of France; in later times it became a Huguenot stronghold. Fine public buildings are the Palais de Justice, formerly a ducal palace, and the Hotel de Ville; seat of univ., founded 1431; has numerous educational establishments, fine library, museums, and several learned associations. Rom. remains include baths, ampthitheatre, etc. Pop. 41,000.

POITOU (46° 30′ N., 0° 30′ W.); ancient province, France (capital, Poitiers); now included chiefly in Vienne, Deux-Sévres, and Vendée.

POKER, card-game of Amer. origin, played without partners; player on dealer's left puts in stake, the *ante*, double of which must be put in by those who wish to play. Five cards are dealt, and players have option of discarding any, and drawing a like number from the pack, in order to form combinations, which rank as follows: pair, two pairs, three of a kind, straight (sequence, irrespective of suit), flush (all of one suit), full house (threes and a pair), four of a kind, straight flush (sequence of one suit), royal flush (straight flush headed by ace).

POKE WEED, or **POKE BERRY** (*Phytolacca desandra*), a hardy perennial plant with racemes of white flowers followed by black berries. Its roots are poisonous.

POLA (44° 52′ N., 13° 50′ E.), town, Istria, Italy; was, prior to World War, principal naval station of Austria, with

strongly fortified natural harbor; has Roman and mediaeval remains and XV. cent. cathedral; was taken by Venice, 1107, and repeatedly destroyed during contests of Venetians and Genoese. During World War major portion of Austrian fleet was shut up in Pola, and harbor was raided by Ital. torpedo boats, Nov., 1916; was scene of daring raid, May, 1918, by four Ital. sailors, known as the 'Four of Pola,' who torpedoed and blew up a battleship of Dreadnought class. In Oct., 1918, sailors, headed by Croatian officers acting under instructions from Jugo-Slav National Council, revolted and seized the ships. A few days before cessation of hostilities Italians, unaware of change, again raided harbor and blew up *Viribus Unitis*, flagship of the Austrian navy, thus inadvertently increasing friction between Jugo-Slavia and Italy. Town was occupied by Italians, Nov., 1918. Pop. 59,300.

POLAND (49°-55° N.; 15° 55'-*c.* 27° E.), republic, E. Europe; bounded N. by Baltic Sea, Danzig Free City, E. Prussia, and Lithuania, E. by Russia (White Russia and the Ukraine), S. by Czecho-Slovakia, W. by Germany; from the Russo-Latvian frontier on the Dvina to Zbrucz R. The surface is plain, the only highland being the Tatra Mts. and Beskids in S.—parts of Carpathian system. The river Vistula flows through the republic. The climate is extreme. Over 20 per cent of the surface is forested; 15 per cent unproductive. The remainder is arable land (more than one-half) or grazing country. Rye, oats, wheat, and barley are the chief cereals raised; potatoes and beetroot yield the largest crops. Cattle, sheep, swine, and horses are largely reared. Among minerals are coal, iron ore, zinc, lead, salt, petroleum, potassium salts. Industries include textiles and minerals. Occupations, manufactures, and commerce have suffered severely from political troubles, and development must wait until peace is secured. At present, Nov., 1920, the country is suffering from an epidemic of typhus, the scourge of famine. Railway mileage is 7,295; lines are state-owned. Navigable waterways, 1,875 miles; mercantile fleet programme, providing for 220,000 gross tons, is being carried out. Roman Catholicism is the national religion, all forms of religion enjoy freedom; there are many Protestants and Jews. R.C. archbishoprics exist at Warsaw and Gnesen; there are twelve bishoprics. Elementary education is compulsory and free, but a national system of education is not yet established. There are universities at Warsaw and Cracow, polytechnics at Warsaw, and many academies. Warsaw is the capital. See MAP POLAND.

All able-bodied men are liable for service in the army. Within the frontiers laid down by Supreme Council on Dec. 8, 1919, area about 80,000 sq. m. Pop. about 20,000,000.

History.—In early times Poland was inhabited by several Slavonic tribes, among which the Poliani attained pre-eminence. Poland first appears as an important state about the X. cent., records previous to this date being so interspersed with legend as to have little historical value. In the reign of Mieczyslas, or Mieszko I., Christianity was introduced, and the suzerainty of the Emperor Otho was acknowledged; Mieczyslas was succeeded in 992 by his *s.*, Boleslas I., under whom the country became a united state; Boleslas greatly increased his dominions by various conquests, and was recognized as king by Emperor Otho III. After his death, in 1025, a time of disorder ensued, ending with the accession of his *grandson*, Casimir, in 1040; in Casimir's reign a great number of foreign ecclesiastics settled in the country; he *d.* in 1058, when his *s.*, Boleslas II., became king. Boleslas succeeded, in the course of a brilliant military career, in regaining Silesia and other provinces which had been lost in the years following the death of Boleslas I.; in 1079, he quarreled with and killed Stanislas, Bishop of Cracow, in consequence of which Gregory VII. laid him under papal interdict and absolved his subjects from their homage and fealty; his subsequent flight to Hungary was followed by his death, in 1081, when his *bro.* Ladislas assumed control, though he had to content himself with only a ducal title, the country continuing as a duchy for over two centuries from this time.

Under Boleslas III., 1102-38, the Prussians were defeated, and Pomerania incorporated in Polish dominions; he encouraged Christianity, in which he was supported by Otho, Bishop of Bamberg. After his death Silesia was practically severed from Poland in the division of his dominions among his *sons*; under Casimir II., 1177-94, all the various parts, except Silesia, were reunited, and a constitution was framed; He *d.* in 1194, when the succession was disputed and the country again subdivided, while Pomerania established its independence. About this time there occurred war against the Prussians, and afterwards against the Teutonic Knights, who seized various territories in Lithuana and Podlachia and settled there. In 1241 occurred an invasion of Mong 's, who inflicted severe defeat on Poles at Liegnitz, but soon afterwards left the

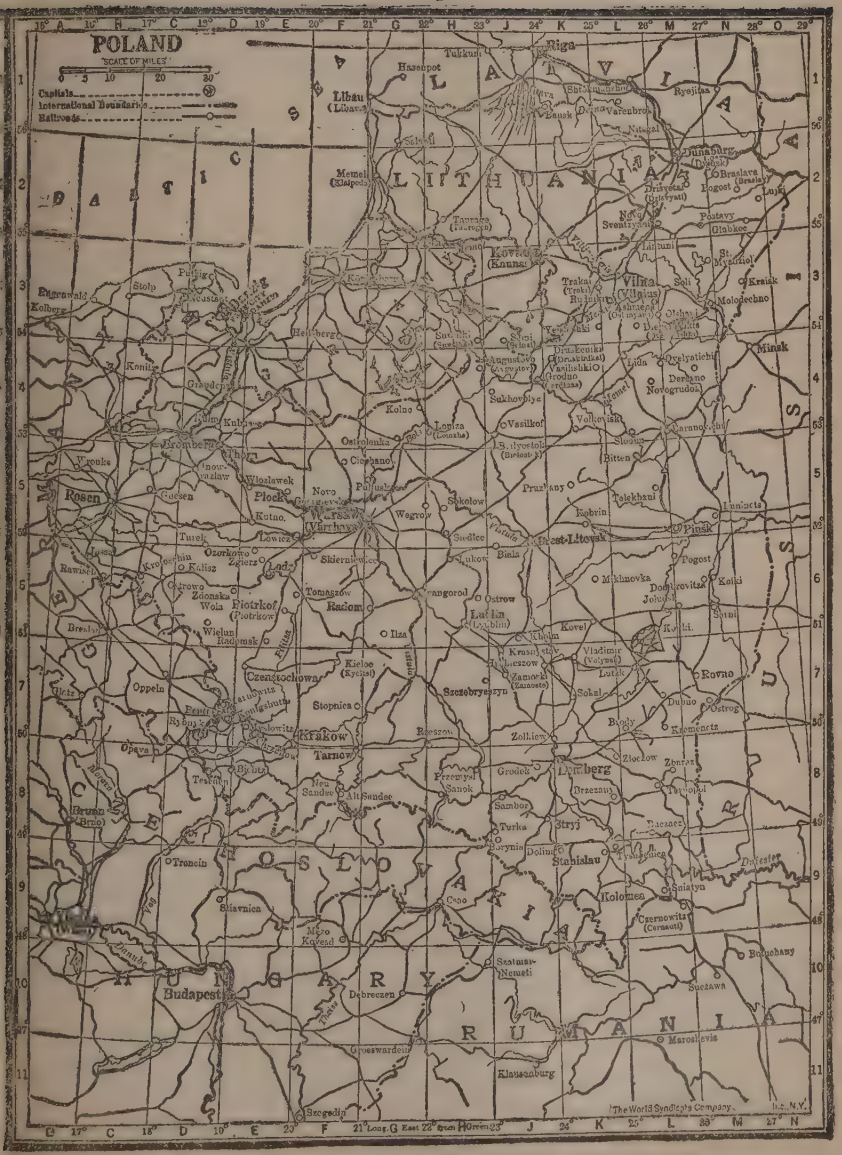
country. Various regions were transferred to Brandenburg during this period, and in reign of Boleslas V., 1247-79, numbers of Jews and Germans established themselves in Poland.

Under Ladislas I., Lokietek, 1306-33, Poland was again united and various reforms were carried out; kingly title was revived in 1320, when Ladislas was crowned with consent of the Pope; and successful war was waged against the Teutonic Knights. Ladislas was succeeded, in 1333, by his *s.*, Casimir III., under whom further reforms were inaugurated, while the country became once more a prosperous and powerful state; wars were waged against Tatars, Lithuanians, and Wallachians, and Galicia was annexed to Poland; on the other hand, all claims to Silesia were finally renounced, in 1335. With death of Casimir, in 1370, the Piast dynasty came to an end, after having ruled for over five centuries. He was succeeded by his *nephew*, Louis the Great of Hungary, who *d.* without male issue, in 1382; his *dau.*, Jadwiga, became queen, in 1383, and in 1386 married Jagiello, Grand-duke of Lithuania, thus uniting Lithuania and Poland (which, however, were again separated in following reign), and founding the Jagiellon dynasty. Jagiello reigned as Ladislas II.; he encouraged Christianity, and defeated Teutonic Knights at Gürnewald, 1410; he was succeeded, in 1434, by his *s.*, Ladislas III., who was elected to Hungarian throne, and was killed at Varna, in 1444. Casimir IV. then became king, again uniting Lithuania and Poland; he obtained W. Prussia and suzerainty over Prussia proper from Teutonic Knights by Treaty of Thorn, 1466. After his death, in 1492, three of his *sons* reigned in succession. Under John Albert and Alexander, the Polish Diet became increasingly powerful, and Lithuania was more firmly united to Poland.

Under Sigismund I., 1506-48, and his *s.*, Sigismund II., 1548-72, Poland may be said to have reached its apogee; former defeated Wallachians, and acquired suzerainty over Moldavia, but lost Smolensk to Basil of Russia; he opposed Reformation, which, however, spread greatly in country under Sigismund II.; the latter captured Livonia from Knights Sword-Bearers; under him Lithuania and Poland were inseparably united, and the state of which Warsaw now became capital was one of the most powerful in Europe. With his death the Jagiellon dynasty ended, and monarchy was made elective. Henry of Valois was first king elected, but he presently gave up his claim on becoming king, as Henry III., of France, and was succeeded in Poland by Stephen Bathori, 1575-86, who waged war against, and defeated, Ivan IV. of Russia, and subdued the Ukraine Cossacks; in his reign numbers of Jesuits settled in country, and gradual decline of Reformed religion began. His successor, Sigismund III., 1587-1633, was *s.* of John of Sweden; he persecuted the Protestants, and formed alliance with Sweden, but failed to establish his claim to Swed. crown. His *sons*, Ladislas IV., 1632-48, and John Casimir, 1648-68, warred against Sweden, Russia, and Turkey; in 1655, Poland was invaded by Charles X. of Sweden, who took Cracow and Warsaw and compelled John Casimir to fly to Silesia; in 1657, Brandenburg succeeded in throwing off the Polish yoke, and in 1668, the king abdicated.

His successor, Michael Wisniowiecki, 1669-73, warred against the Turks, who were eventually defeated by John Sobieski. At Michael's death John Sobieski was elected king; he gained brilliant victory over Turks at Vienna, 1683, but his reign was disturbed by quarrels among nobles. After his death, in 1697, Elector Frederick Augustus of Saxony became king as Augustus II.; he regained Ukraine from Turks; made treaty with Russia, and warred against Charles XII. of Sweden, who secured his deposition and election of Stanislas Leszcynski to Polsih throne; but after Charles's defeat at Poltava, in 1709, Augustus was reinstated; his reign is also marked by persecution of Protestants and by beginnings of Polish dependence on Russia; he *d.* in 1733, when the election of his *s.*, Augustus III., was secured by Russian influence, which further increased during this reign. Augustus III. was succeeded by Stanislas Augustus Poniatowski, in 1764; in his reign various reforms which had been effected by the Czartoryski party were repealed through Russian influence, against which the patriotic insurrection known as the Confederation of Bar was unsuccessfully directed, in 1768; in 1772, occurred the First Partition of Poland, at whose expense Russia, Austria, and Prussia then extended their dominions. The 1788-91 Diet made great effort to reform constitution and to make monarchy hereditary; Russia, however, interfered, and was joined by Prussia in invading Poland, and by a Second Partition, in 1793, both these powers obtained further territories.

The Poles, led by Kosciuszko, rose in rebellion, in 1794, and the invaders were at first defeated, but were presently joined by Austria; patriots were finally defeated by the capture of Warsaw by the allies; and by the Third Partition, 1795, the rest of the country was divided among the three great powers, and Po-


POLAND
SCALE OF MILES
0 5 10 20 30
Capitals
International Boundaries
Railroads
Riga
Libau (Libau)
Memel (Klaipeda)
Kovno (Kaunas)
Vilna (Vilnius)
Minsk
Grodno
Bialystok
Brest-Litovsk
Pinsk
Rovno
Lutsk
Dubno
Ostrog
Lemberg
Tarnopol
Stanislau
Kolomea
Czernowitz (Cernauti)
Suczawa
Marosvasarhely
Klausenburg
Nagy-Szalonta
Debreczen
Budapest
Szegedin
Gyoengyoes
Miskolcz
Kaschau
Eperies
Tarnow
Krakow
Sandec
Neu Sandec
Alt Sandec
Przemysl
Sanok
Stryj
Drohobycz
Boryslaw
Zolkiew
Zloczow
Brody
Kremenetz
Sokal
Szczebrzeszyn
Zamosc
Lublin
Radom
Kielce
Ilza
Ostrolenka
Lomza
Suwalki
Augustowo
Sokolow
Siedlce
Biala
Kobrin
Pruzhany
Slonim
Baranovichi
Novogrudok
Molodechno
Vilkomir
Ponevezh
Shavli
Tauroggen
Mitau
Windau
Libau
Hasenpot
Tukkum
Pernau
Arensburg
Dorpat
Reval
Narva
Pleskau
Luga
Gdingen
Danzig
Dirschau
Stolp
Putzig
Neustadt
Lauenburg
Bromberg
Inowrazlaw
Wloclawek
Plock
Mlawa
Soldau
Neidenburg
Ortelsburg
Lyck
Johannisburg
Goldap
Pillkallen
Insterburg
Tilsit
Ragnit
Memel
Konitz
Kulm
Thorn
Gollub
Strasburg
Graudenz
Marienwerder
Rosenberg
Neidenburg
Posen
Gnesen
Kutno
Lowicz
Warschau
Wegrow
Pultusk
Nowo Georgievsk
Ostrolenka
Ciechanow
Przasnysz
Makow
Novo Georgievsk
Wreschen
Jarotschin
Ostrowo
Kalisz
Lodz
Pabianice
Petrikau
Radomsk
Tomaszow
Piotrkow
Wieluni
Czenstochowa
Oppeln
Rybnik
Pless
Beuthen
Kattowitz
Myslowitz
Sosnowitz
Dombrowa
Stopnica
Opava
Troppau
Jagerndorf
Bielitz
Teschen
Freistadt
Mistek
Neutitschein
Prerau
Hradisch
Olmutz
Brunn (Brno)
Tronein
Silvanica
Miskolcz
Kaschau
Eperies
Bartfeld
Zeben
Homonna
Munkacs
Ungvar
Stryj
Turka
Sambor
Drohobycz
Boryslaw
Stanislau
Kolomea
Czernowitz
Suczawa
Bistritz
Marosvasarhely
Klausenburg
Nagy-Szalonta
Debreczen
Budapest
Szegedin
Gyoengyoes
Miskolcz
Kaschau
Eperies
Tarnow
Krakow
Sandec
Przemysl
Lemberg
Tarnopol
Zloczow
Brody
Kremenetz
Rovno
Lutsk
Dubno
Ostrog
Sokal
Szczebrzeszyn
Zamosc
Lublin
Radom
Kielce
Ilza
Ostrolenka
Lomza
Suwalki
Augustowo
Sokolow
Siedlce
Biala
Brest-Litovsk
Pinsk
Kobrin
Pruzhany
Slonim
Baranovichi
Novogrudok
Molodechno
Vilkomir
Ponevezh
Shavli
Tauroggen
Mitau
Windau
Libau
Hasenpot
Tukkum
Riga

land as a separate political unit ceased to exist.

In these three partitions Russia did not annex any ethnically Polish territory, this being all divided between Austria and Prussia, the latter taking Warsaw. Russia's acquisitions were exclusively in Lithuanian. White Russian, and Little Russian territories. In 1807 and 1809, after wars against Prussia and Austria, Napoleon reunited most of ethnic Poland in the Grand-duchy of Warsaw. In 1815, at the Congress of Vienna, Prussia recovered Posnania and Thorn, but most of the grand-duchy was formed into the so-called congress-kingdom of Poland, to be ruled by the tsar as an independent state. It was then only that ethnic Polish territory came to be united with Russia. National risings occurred in Austrian Poland, in 1846, in Prussian Poland, in 1848, in Russian Poland, in 1830 and 1863. After the revolution of 1863, the congress-kingdom was deprived of its separate government.

In 1914, for the first time, the partitioning powers were ranged in war against each other; this was Poland's chance. Russia, in Aug., 1914, put forward a programme of reunion of all ethnically Polish territories in an autonomous state under Russia. Austria-Hungary aimed at uniting Russian Poland with Galicia as a third partner in the dual monarchy. As this scheme would have left Prussian Poland the only unredeemed Polish territory, and thus concentrated the Poles on an anti-German front, it met with Germany's opposition. By Aug., 1915, all Russian Poland fell under military occupation of Central Powers. On Nov 5, 1916, proclamation was issued by them forming it into kingdom under their auspices. But again disagreement between Germany and Austria, as well as German ill-will towards and distrust of the Poles, prevented all genuine development. On March 30, 1917, the first revolutionary Russian government acknowledged Poland's independence within her ethnic frontiers. This programme was endorsed by Allied and Associated Powers. In July, 1917, Polish National revolutionaries under Pilsudski, who at the beginning of the war had taken the field against Russia, turned against Central Powers; Pilsudski, from 1914-16, brigadier in Austro-Polish legions, was imprisoned in Germany. On outbreak of German revolution, Nov., 1918, he returned to Poland and became the chief of the new Polish state.

President Wilson's fourteen points stipulated for independent Poland, including 'territories inhabited by indisputably Polish population,' with free access to the sea. This programme was realized by Paris conference, at which Poland was conceded position of ally and where her cause was brilliantly pleaded by Paderewski, the famous pianist, at that time Polish premier. By Treaty of Versailles, Germany renounced Posnania and most of W. Prussia, whereby E. Prussia was separated from rest of Germany. Danzig and its surroundings were formed into a Free City under the League of Nations, full use of its harbor, and control of its foreign relations being conceded to Poland. Plebiscite was ordered in other parts of E. and W. Prussia claimed by Poland, but this having gone decisively against her, territories reverted to Germany in summer of 1920. Another plebiscite was ordered in Upper Silesia and resulted in the division of that country between Germany and Poland. (See SILESIA.) Of the territories of the late Russian Empire the so-called congress kingdom was assigned to Poland, without Northern Lithuanian part of Suvalki, which was ceded to Lithuania, but with addition of district of Bielostok ceded by Prussia to Russia, in 1807. Of late Austrian territories Poland received W. Galicia, Dec., 1919, and part of Teschen, June, 1920. A treaty concluded between Poland and principal Allied and Associated Powers, June 1919, secured rights of national and religious minorities in Poland, placing them under protection of the League of Nations.

But Polish claims in the E. exceeded by far ethnic border of Poland. Between this border and Poland's frontiers of 1772 lie Lithuania, White Russia, E. Galicia, and the Western Ukraine, territories more than twice the size of all ethnic Poland. In most parts of these Poles form less than five per cent of pop —only in E. Galicia as much as 20 per cent. But most of the nobility, owning nearly half of the land, is Polish, and so is part of the intelligentsia; the vast majority of the population, the Lithuanian and Russian peasantries, are intensely anti-Polish. From the very outset, Poland, disregarding friendly warnings from Brit. Government, engaged in wars for conquest of these territories. By July, 1919, Poland succeeded in crushing resistance of Little Russians in E. Galicia. In Nov., 1919, Allied and Associated Powers proposed compromise —wide self-government for E. Galicia under Polish mandate for 25 years. Offer rejected by Poles, who preferred to hold E. Galicia by military force, though without legal title. Similarly aggressive policy was pursued by Poland toward Lithuania. Her cap., Vilna, occupied by Poles, April, 1919; two successive lines of demarcation laid down by Paris con

ference violated by Poles. Once more, in spring of 1920., Poland continued war against Russia, pushing further and further into purely Russian territory, and demanding renunciation by her of territory up to frontiers of 1772, inhabited by well over 20,000,000 Russians. Polish expedition against Kiev, April-May, 1920, resulted in defeat, and only when Bolsheviks invaded ethnic Poland were the Poles able—thanks to help of Fr. generals—to defeat them in turn. By Art. 87 of Versailles Treaty, Poland had agreed to accept frontier in E. drawn for them by the Allies. (See RUSSIA.)

Wars of conquest in the E. had disastrous effects on Poland's economic and financial position, frustrating attempts at reconstruction. The first Diet of reunited Poland, elected by universal suffrage in Jan., 1919, passed an Act of Land Reform limiting amount of land to be held by a single person, and assigning the surplus for division among peasants, compensation to be paid to previous owners.

A constitution was adopted on March 17, 1921. This combined features of the French and American constitutions. The executive power vested in a president elected for seven years by a national assembly. There was also a cabinet responsible for legislature. The legislative power consists of a House and a Senate. The judiciary is framed on the model of the United States. The rights of minorities were guaranteed by special legislation.

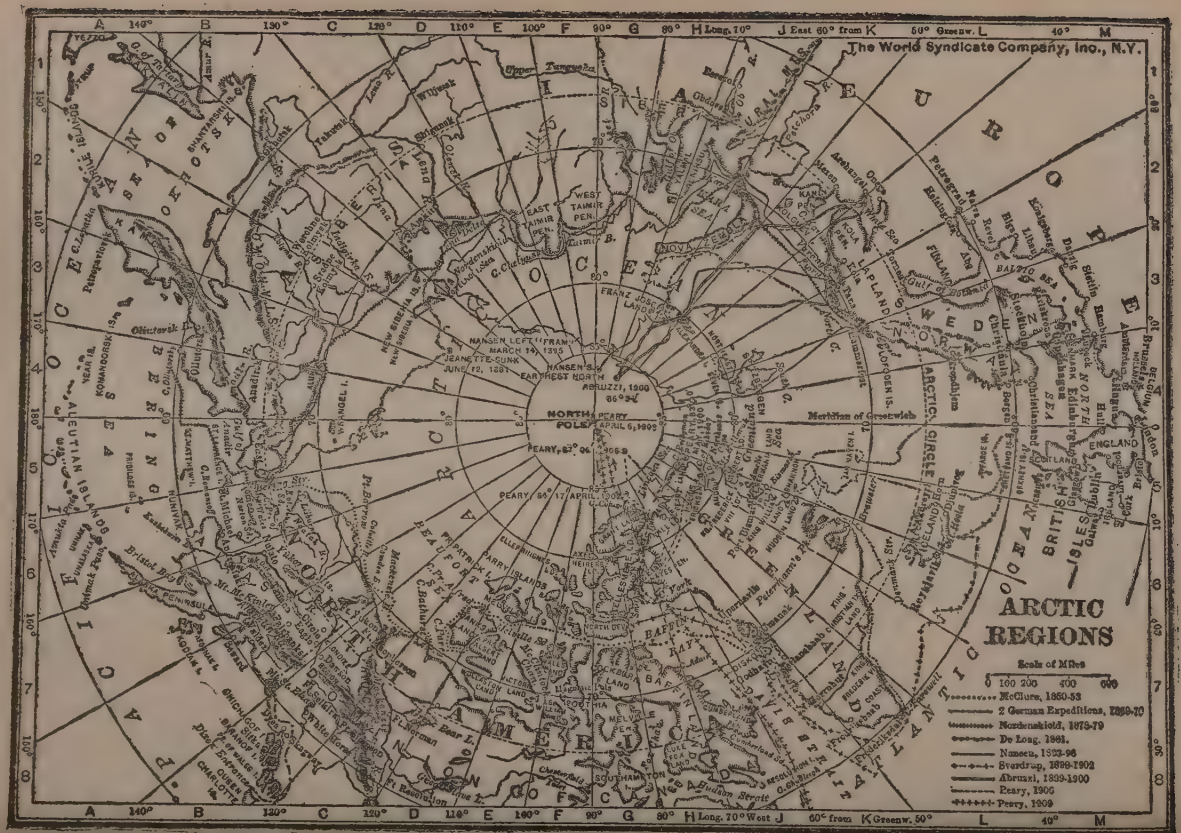
The treaty of peace with Russia was signed at Riga, on March 18, 1921. By its terms Russia lost 87,000 sq. miles, with a population of about 7,000,000. Threats of continued hostilities between the two nations continued throughout the year. Through the influence of neutral countries war was avoided. An alliance with Rumania was made early in 1921. Poland was awarded the city of Vilna by the League of Nations, and was also given a favorable decision in the dispute over Upper Silesia. Practically all the valuable mineral territory which had been so useful to Germany was awarded to Poland. The financial and economic condition of the country continued unsatisfactorily during these years, and the currency was greatly depreciated. With the signing of trade agreements with France and Italy, in 1921, conditions improved. Treaties were signed by the Balkan states also in this year.

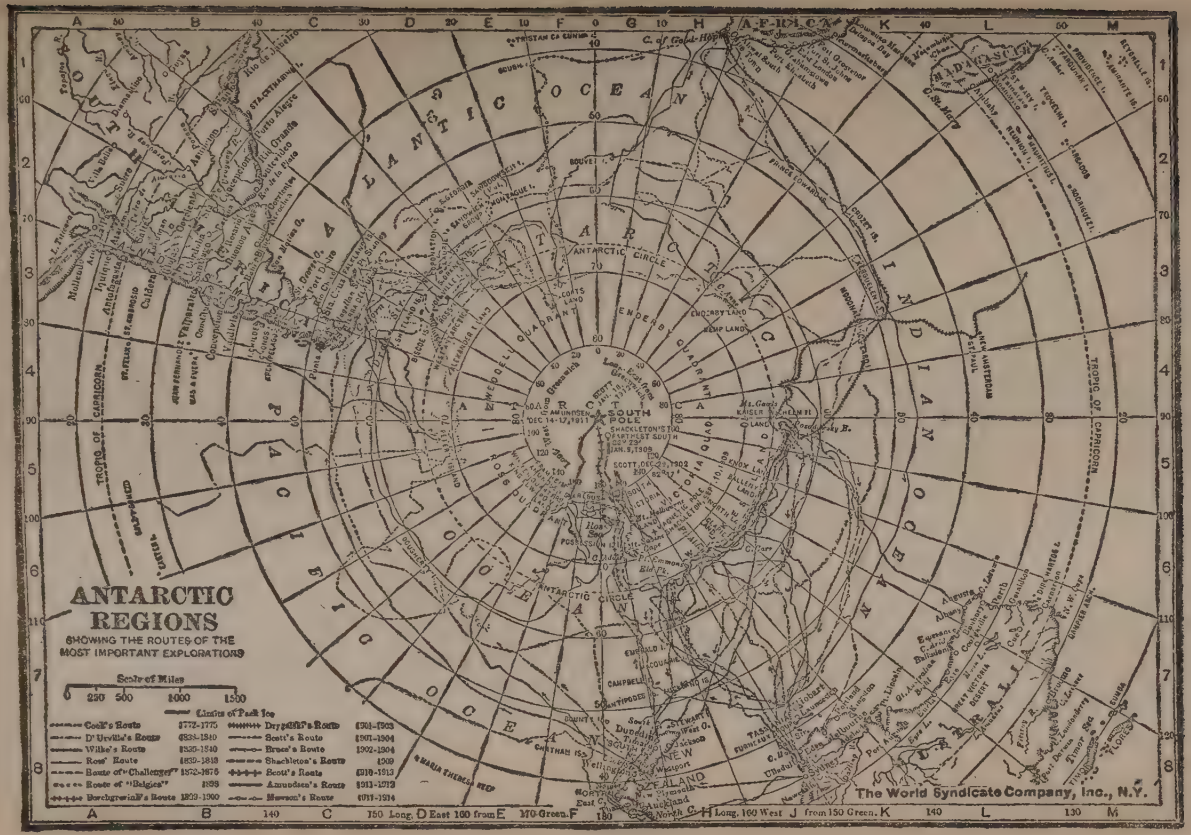
In 1922, General Pilsudski, who had acted as president since the establishment of Poland as a free state, resigned. In the first National election, Professor Gabriel Narutowicz was elected president by the National Assembly on December 9. Three days later he was assassinated, and Stanislas Wojciechowski was elected president to succeed him. Ladislas Sicorski was appointed prime minister. Economic conditions improved somewhat, in 1923, but the apparent necessity of maintaining a large standing army which amounted to nearly 500,000 men, was a great drain on the resources of the country. The Polish force, in May, 1923, seized the Lithuanian city of Memel, but withdrew at the request of the League of Nations.

POLAR BEAR. See BEAR.

POLARISCOPE, an instrument invented for showing the polarization of light, or for examining transparent objects to determine their polarizing power. See POLARIZATION.

POLAR REGIONS. From the chronicle of Alfred the Great, we learn that Othere and Wulfstan made voyages in the Arctic Ocean, probably around the N. coast of Lapland, but their exact route cannot be determined. In the 10th and 11th centuries Norsemen made various voyages of discovery in the Far North. In 1001 Eric 'the Red,' an Icelander, made a settlement on the W. coast of Greenalnd. Cabot, in 1497, discovered Newfoundland and Labrador; subsequently Gaspar Cortereal attained a lat. of 60° N. But Arctic expeditions were comparatively sporadic until the 16th cent., when the minds of the adventurous were fired by the idea of a N. E. or a N. W. Passage to the rich countries of the East, for, according to current beliefs, America and Asia were a geographical unit. The original motive of Polar explorations was therefore commercial and not scientific, and the direction was not due N., but either tive of Polar exploration was therefore commercial and not scientific, and the direction was not due N., but either N.E. or N.W. In 1553, Sir Hugh Willoughby, in search of the N.E. Passage, discovered Novaya Zemlya, but he and his party ultimately perished. In 1556, Stephen Burrough discovered the Kara Strait, and in 1580 the Yugor Strait was discovered by Pet and Jackman. In 1585 Davis discovered Davis Strait and attained a lat. of 72° 41′ N. Barents discovered Bear I. and Spitzbergen in 1596, and was the first European explorer to winter in the Arctic regions. In 1607 Henry Hudson touched Cape Hold and discovered Hakluyt I. In 1610 he tried the N.W. Passage and discovered Hudson Strait. Hudson Bay he believed to be a part of the Pacific Ocean (this was refuted by Button in 1613). In 1615, Baffin found the outlet in Baffin Bay and recorded some inval-


The World Syndicate Company, Inc., N.Y.
ARCTIC REGIONS
Scale of Miles
0 100 200 400 600
McClure, 1850-53
2 German Expeditions, 1869-70
Nordenskiold, 1873-79
De Long, 1881
Nansen, 1893-96
Sverdrup, 1898-1902
Abruzzi, 1899-1900
Peary, 1906
Peary, 1909
NORTH POLE APRIL 6, 1909
PEARY, 87° 06
PEARY 88° 17' APRIL 1906
NANSEN LEFT FRAM MARCH 14, 1895
JEANNETTE SUNK JUNE 12, 1881
NANSEN'S FARTHEST NORTH ABRUZZI, 1900 86° 34'
Meridian of Greenwich
ARCTIC CIRCLE
FRANZ JOSEF LAND
NOVAYA ZEMLYA
SPITZBERGEN
GREENLAND
ICELAND
NORWAY
SWEDEN
FINLAND
RUSSIA
EUROPE
ENGLAND
BRITISH ISLES
NORTH SEA
BALTIC SEA
ATLANTIC OCEAN
ARCTIC OCEAN
PACIFIC OCEAN
BERING SEA
ALEUTIAN ISLANDS
NORTH AMERICA
BAFFIN BAY
DAVIS STRAIT
HUDSON BAY
HUDSON STRAIT
LABRADOR
NEW SIBERIA ISLANDS
WRANGEL I.
WEST TAIMIR PEN.
EAST TAIMIR PEN.
KARA SEA
WHITE SEA
BARENTS SEA
GREENWICH
A 140° B 130° C 120° D 110° E 100° F 90° G 80° H Long. 70° J East 60° from K Greenw. L 50° M
A 140° B 130° C 120° D 110° E 100° F 90° G 80° H Long. 70° West J 60° from K Greenw. 50° L 40° M


ANTARCTIC REGIONS
SHOWING THE ROUTES OF THE MOST IMPORTANT EXPLORATIONS
Scale of Miles
250 500 1000 1500
Limits of Pack Ice
Cook's Route 1772-1775
D'Urville's Route 1838-1840
Wilkes's Route 1838-1840
Ross' Route 1839-1843
Route of "Challenger" 1872-1876
Route of "Belgica" 1898
Borchgrevink's Route 1899-1900
Drygalski's Route 1901-1903
Scott's Route 1901-1904
Brues's Route 1902-1904
Shackleton's Route 1909
Scott's Route 1910-1913
Amundsen's Route 1911-1912
Mawson's Route 1911-1914
SOUTH POLE
AMUNDSEN DEC 14-17, 1911
SCOTT DEC 29, 1911
SHACKLETON (FARTHEST SOUTH) JAN. 9, 1909
ANTARCTIC CIRCLE
ATLANTIC OCEAN
PACIFIC OCEAN
INDIAN OCEAN
AFRICA
AUSTRALIA
NEW ZEALAND
SOUTH AMERICA
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uable observations. On his return journey he discovered Jones Sound and Lancaster Sound. In 1631, Fox and James explored the coast of N. America and reached Peregrine Point in the Fox Channel. The quest was then abandoned for over a century.

Peter the Great gave an incentive to Russian exploration, and in 1725, gave Bering the conduct of an exploring expedition. On reaching Kamchatka, Bering discovered that America and Asia were not continuous. In 1741, he crossed the Sea of Okhotsk and reached the Northern coast of America, but *d.* on Bering I. Phipps sailed, in 1773, to Spitzbergen and attained a lat. of 80° 48′ N. Subsequently Scoresby registered important geographical observations in Jan Mayen I. and the E. coast of Greenland, 1822.

In 1818, Sir John Ross, with the *Isabella* and *Alexander*, set out to explore the regions discovered by Baffin and abandoned for over a century. In 1819, Parry, in command of *Hecla* and *Griper*, located N. Devon, Cornwall, and Bathurst Islands, and Cape Walker, and Banks Land. In 1821, in command of *Fury* and *Hecla*, he sailed up Fox Channel and named the Fury and Hecla Straits. In 1829, Ross sailed up Regent Inlet to the Gulf of Boothia, which he named after Felix Booth, a distiller who financed the expedition. Sir J. C. Ross, his *nephew*, explored King William Land and discovered the North Magnetic Pole, 1831.

In 1845, Franklin started on his ill-fated voyage. He sailed in command of *Erebus* and *Terror*, in search of a N.W. Passage, via Lancaster Sound and Bering Strait. The ships were last seen in Baffin's Bay. In 1848, the first of the many search expeditions was dispatched. In 1859, M'Clintock found traces of the expedition and a MS. recording the route of the vessels and the death of Franklin, in June, 1847, on King William Land. The crews of *Erebus* and *Terror*, under Captain Crozier, had started for the Great Fish R., and their remains were found near Adelaide Peninsula by Dr. Rae. Dr. Hayes, in 1831, reached a lat. of 81° 35′ at Cape Lieber. Captain Hall, with *Polaris*, reached 82° 16′ lat. and named Polaris Bay. In 1875, the great Nares expedition started with *Alert* and *Discovery*. *Alert* wintered off Grinnel Land in lat. 82° 24′ N. The sledge party, under Markham, reached 83° 20′. Lockwood of the Greely expedition, in 1881, reached Lockwood I., 83° 24′ N., the Farthest North till the voyage of Nansen. There were 25 explorers in this expedition, of whom 18 perished.

Lieut. Peary, in 1892, crossed the N. of Greenland to Independence Bay. In 1893, Nansen began his voyage in *Fram*, which reached a lat. of 85° 57′, and he himself, on foot, reached 86° 14′ N. In 1897, a balloon expedition, under Andre, Strindberg, and Fraenkel, perished in search of the North Pole. Captain Cagni, in 1900, reached 86° 33′. In 1903, Amundsen, in command of *Gjoa*, started on an expedition to survey the region of the North Magnetic Pole, and accomplished the N.W. Passage entirely by water, which M'Clure had failed to do, in 1850.

The year 1909 witnessed the culminating event of North Polar exploration. Lieut. Peary, in *Roosevelt*, with six colleagues and a large party of Eskimos trained during his long sojourns in the Far North, taking 133 dogs and 19 sledges, started in 1908, for the Pole. His method of advance was original, and aimed at saving the strength of the leaders for the final stages. A pioneer party, lightly equipped, marched a day ahead and cleared the route for the main party. Companies at various stages returned with the empty sledges and exhausted followers. Prof. Marvin was drowned while crossing a big *lead*—the only fatality of the expedition. Peary hoisted the American flag at the Pole on April 6, 1909. Dr. Cook alleged that he had gained the Pole a year before, and at first received due honor for it, but his proofs were discredited.

Amundsen, in the summer of 1918, set out on a long polar voyage across the North Polar basin, but owing to unfavorable currents off the Siberian coast had not been able to begin the drift in the ice by Aug., 1920. He, however, discovered new land near Nicholas II. Land, which was thoroughly explored, and has completed the N.E. Passage. His expedition returned in 1922.

Antarctic Explorations.—The Antarctic region was not explored for centuries after the Arctic had been an object of research and adventure. The idea of a rich and wealthy southern continent was in the minds of the early southern explorers—an idea that was doomed to have a rude disillusioning. The pioneer of Antarctic exploration was Captain Cook, who reached a lat. of 71° 10′ S., in 1774. Cook discovered and named S. Georgia and the Sandwich group. In 1819, William Smith discovered the S. Shetlands. The next great expedition was sent out by Russia under Fabian von Bellingshausen. He reached lat. 69° 53′ S. and named Peter I. Isl. In 1823, Weddell reached lat. 74° 15′ S. In 1830, Biscoe discovered Biscoe I. and sighted Graham Land. In 1839, John Balleny named and discovered Balleny Islands. Dumont d'Urville's expedition, 1838-40,

discovered Zionville Land, Louis Philippe Land, Adelie Land and Cote Clairie. Wilkes, of the U. S. navy, discovered Wilkes Land to the W. of Belleny Islands.

In 1840, J. C. Ross's great expedition sailed to the S. with *Erebus* and *Terror*. To mark the British occupation Ross named the Possession Islands and Victoria Land, which he skirted from Cape North to Cape Crozier. He discovered the marvellous ice barrier which rises precipitously out of the sea to the height of 200 feet, subsequently the base of the Brit. and Norweg. expeditions. He named Mt. Erebus (12,922 ft.), and Mt. Terror (10,900 ft.), located the South Magnetic Pole (75° 5′ S., 154° 8′ E.), and reached a lat. of 78° 9′ 30″. In 1898, Captain de Gerlache spent the winter within the Antarctic Circle, his ship, *Belgica*, being ice-bound. This was the first winter sustained by man within the Circle. In 1898, C. E. Borchgrevink made an expedition to Victoria Land in *Southern Cross*, wintering at Cape Adare.

In 1901-4, the Brit. National Antarctic expedition, led by Captain R. F. Scott, in *Discovery*, followed the Ross Barrier eastward and named Edward VII. Land. Captain Scott, Dr. Wilson, and Sir Ernest Shackleton (third officer of *Discovery*) attained with sledges a 'Farthest South' of 82° 17′. In 1901, the Ger. Antarctic expedition, in *Gauss*, sailed southward. New land was discovered and named Wilhelm II. Land. An extinct volcano (1,200 ft.) in the new territory was named Gaussberg. In 1901, the Swed. expedition sailed in the vessel *Antarctic* and made valuable geographical discoveries, proving the continuity of Oscar II. Land, Louis Phillippe Land, and Graham Land. *Anarctic* was lost in 1903, but the crew was rescued. In 1902, the Scot. National Antarctic expedition, in *Scotia*, explored Weddell Sea and discovered new land (Coats Land) in lat. 72°-74° S. The expedition returned in 1904, after establishing an observatory on the S. Orkneys, since maintained by the Argentine Government.

A great advance S. was made, in 1907, by Sir Ernest Shackleton, in command of *Nimrod*. His route was via the Beardmore Glacier to King Edward VII. Plateau. He attained a 'Farthest South' of 88° 73′ (within 97 miles of the Pole). In 1910, two vessels were equipped for expeditions—*Terra Nova*, a Brit. vessel, commanded by Captain R. F. Scott, and *Fram*, a Norwegian ship, commanded by Captain Roald Amundsen. Amundsen started a few months later than Scott. His vessel was originally equipped for northern exploration, and the announcement, in Oct., 1910, that it was destined for the Antarctic occasioned much surprise. Peary's successful expedition to the North Pole had caused him to abandon his projected Arctic expedition and seek the Southern Unknown. He reached the Pole on Dec. 14, 1911.

Captain R. F. Scott set out to discover the South Pole, and to make a scientific and geographical survey of the South Polar regions. His company therefore included several scientific experts. His vessel, *Terra Nova*, sailed into Robertson Bay, landed a geological party at Cape Adare, and then landed the Polar party in M'Murdo Sound. Scott's first task was to station a depot E.S.E. of Hut Point, the winter quarters of the previous expedition. On Feb. 8, 1911, Captain Scott proceeded S., but owing to the severity of the weather and the loss of several ponies, the party was forced to return to the main base, after depositing a ton of stores at 'One-Ton Camp.' On visiting Hut Point, Scott learned of the arrival of *Fram*. In November, accompanied by Dr. Wilson, Captain Oates, Lieut. Bowers, and petty officer Evans, he pushed southwards and reached the South Pole on Jan. 18, 1912. On the return journey he and his four companions perished. Seaman Evans died from concussion, on Feb. 17, 1912; Captain Oates, who had been failing for some time, rather than be a drag upon his comrades, on March 17, walked from the tent and perished; Captain Scott, Dr. Wilson, and Lieut. Bowers died from exposure, on March 29.

Following the discoveries of the North and South Poles, polar exploration took on a more specialized aspect. Expeditions under various leaders sought to develop various phases of polar research. The logical successor to Peary was Donald B. MacMillan, who accompanied Peary on his successful expedition to the Pole. MacMillan carried on explorations in the Arctic regions, devoting himself chiefly to natural history, physics, and geography. One of the most interesting results of his work was the discovery that Crocker Land, which Peary reported having seen, did not exist. MacMillan carried on expeditions in 1921 and 1922, and in 1923, undertook still another journey. Raoul Amundsen continued explorations in 1921, but was unfortunate in the disabling of his ship, and was obliged to return, In 1922 and 1923 he made preparations for reaching the Pole by aeroplanes.

Among the most important expeditions were those of Stefansson, who explored Wrangel Land, and other regions N. of Alaska. Sir Ernest Shackleton continued to carry on explorations in the Antarctic regions. Other researches were carried on by Knut Rasmussen in the N. polar region, and by Professor Holtdahl,

who made important researches in Nova Zembla.

POLARIZATION (1) of an electric cell refers to the falling off of the current as a result gf the chemical action within the cell. The chief differences in cells consist in the various devices for obviating polarization. In the simple voltaic cell polarization is caused by the accumulation of hydrogen on the copper plate.

(2) *Polarization of Light.* See LIGHT. Polarization of a ray may also be produced by its reflection from a polished surface at a particular agnle of incidence. It is found that when polarized light is passed through a tube containing a solution of cane sugar, the plane of polarization is torated through an angle which depends on the strength of the solution, and this has been developed into a method (*saccharimetry*) for determining the proportion of cane sugar in any given sample.

POLE, See ROD.

POLECAT. See WEASEL FAMILY.

POLE, NORTH AND SOUTH. See EARTH; POLAR EXPEDITIONS.

POLE, REGINALD (1500-58), cardi-*dau.* of the Duke of Clarence, the *bro.* of nal; *s.* of Sir Richard Polo and Margaret, Edward IV. and Richard III.; ed. at Salisbury, and in 1517 was app. prebend of Salisbury. On the divorce of Henry VIII., P. was against the king, and therefore obliged to go abroad; cr. cardinal, 1536, and legate of Viterbo, 1541; prominent at Council of Trent, and on the accession of Mary returned to England as papal legate, becoming abp. of Canterbury, 1556.

POLE, RICHARD DE LA (*d.* 1525), the 'White Rose'; *nephew* of Edward IV. of England, and inheritor of pretensions to crown; supported by Fr. king during reign of Henry VIII.; slain at Pavia.

POLE STAR. See STARS.

POLE, WILLIAM (1814-1900), Eng. engineer and musician; *b.* Birmingham; worked under Stephenson and Rendel; prof. of Engineering at London Univ., 1859-67; pub. *The Philosophy of Music, 1879.*

POLE-VAULTING, sport in which jumper endeavors to leap over bar with aid of pole, which he drops when in mid air; if bar is displaced, vault is foul.

POLICE, a system of administration of a country organized for the maintenance of good order of society. It is also the means or system adopted by the authorities of a government, state or community to maintain public order and liberty, and protect property. In the more limited sense, it is the administration of laws, by-laws, and regulations of a city. The name is often used for an abbreviation of the term 'police force.'

POLIGNAC, old Fr. family of the Velay. In XVII. cent. Scipion Sidoine Apollinaire Gaspard, Vicomte de P. (*d.* 1739), and Cardinal Mehlchior de P. 1661-1742, were famous.

POLISHES, substances used to create a lustrous surface, either by smoothing away irregularities or by coating the material with a thin film of some reflecting medium. Metals are usually polished by rubbing the surface with a mixture containing finely-divided emery powder, which wears away slight irregularities in the surface.

POLIGNY (46° 49′ N.; 5° 43′ E.), town, Jura, France; ruined castle. Pop. 3,500.

POLITIAN, POLIZIANO, ANGELO (1454-94), Ital. man of letters; app. prof. of Classics at Florence, and was recognized as first scholar of his day.

POLITICAL AND SOCIAL SCIENCE, AMERICAN ACADEMY OF.—Founded in Philadelphia, in 1887. Incorporated in 1891. The Philadelphia Social Science Association, 1869, merged with the Academy when founded, and transferred to it its library and documents. The purpose of the Academy is to collect political and scientific data and keep its members informed on the progress made in these lines. Annual meetings are held in April, and there are four monthly meetings in winter. Special volumes are published every year and a bi-monthly *Annals.* The membership is about 8,000.

POLITICAL ECONOMY. See ECONOMY, POLITICAL.

POLITICAL ELECTIONS, CORRUPTION IN. See CORRUPT PRACTICES.

POLITICAL PARTIES, organizations of citizens more or less agreed upon some particular principle or principles who seek to elect officials in sympathy with their views and gain control of the Government. While at any given period there may be several parties seeking to sway the electorate, the great bulk of the citizenry is usually divided into two great parties, so superior in numbers to all others that one of the two is morally certain to win the election. Whatever the name employed, these two parties, as a rule, represent respectively

the conservative and liberal elements of the country; the conservatives seeking to maintain things as they are, the liberals endeavoring to introduce alleged reforms into the conduct and policy of government. While this is a broad generalization, and has many exceptions, it characterizes fairly well the political parties of the United States and Great Britain, and indeed most of the countries of Europe.

In the colonial period the people of this country were roughly classed as Whigs or Tories, the latter supporting the British Government, while the former adopted a critical or adverse attitude toward the Crown and its ministers. During the Revolutionary struggle, the Whigs took the name of Patriots, while those in sympathy with the British were known as Loyalists.

During the campaign for the ratification of the Constitution those who favored it were known as Federalists while their opponents were styled anti-Federalists. Following its adoption, the Federalists, under the lead of Washington and Hamilton, advocated a strong centralized government and a liberal construction of the Constitution. The Republicans, under Jefferson and Madison, favored a strict adherence to the letter of the Constitution and a limited scope of national authority.

Following the War of 1812, the Federalist party, as an organization, went out of existence, and the choice of Presidents was more as a matter of personal liking than of party demand. Thus, in the election of 1824, there were four Republican candidates. Later came a new alignment of parties. The more radical wing of the Jeffersonian Republicans assumed the name of Democrats. The opposing element took the name of the National Republican party which was soon merged into that of Whigs. The latter embraced most of the business and financial elements of the country, and their principles were largely those of the former Federalists. They favored the national bank, the protective tariff, and a liberal construction of the Constitution. One or the other of these two great parties at different intervals controlled the country, until 1860.

Many minor parties appeared however in that period, and some of them had a marked influence upon the nation's development. Of lesser importance were the Anti-Masonic party, the Hunkers, the Locofocos, and the Barnburners. The Know Nothing party, anti-Roman Catholic in character, carried a number of states in 1854, and two years later polled a considerable vote for its Presidential candidate. More potent in their influence were the Abolitionists, the Free Soilers, and the Liberty party, which, while differing in some respects, were all united in their common opposition to slavery. Most of these elements were later merged in the Republican party, which took a strong stand against the extension of slavery into the Territories, elected many members to the House of Representatives in 1854, and, although defeated in the Presidential election of 1856, won against a divided Democratic party, in 1860, and made Abraham Lincoln President. Since that date the control of the national government has been held by one or the other of these two parties. Popular discontent with the policies of both has led to the formation of minor parties, such as the Greenback party, the Union Labor party, the Populists, the Prohibitionists, the Socialists, and the Progressives; but these have played a minor role, and while they have at times affected the results of elections, they have never gained control of the executive and legislative branches of the Government.

POLITICAL SCIENCE, ACADEMY OF.—Founded, in New York, in 1880. The main purpose of the Academy is to cultivate political science and apply it to solve political and social questions which are discussed at semi-annual meetings. The President of the United States, cabinet members, and other distinguished men have addressed the Academy. The 43rd meeting was held in 1923. The Academy publishes *Proceedings*, descriptive of the meetings; *The Political Science Quarterly*, and *American Record of Political Events*. The membership is about 5,000.

POLITICS, INSTITUTE OF (WILLIAMS COLLEGE).—Founded at Williams College, Williamstown, Massachusetts, May 1, 1913, and inaugurated in the summer of 1921. Its main purpose is the study of politics and the understanding of international problems and relations. It offers scholars and governing officials an opportunity to exchange views, and to afford meetings between men of thought for a few weeks in summer. The membership consists of the faculties of colleges and universities, and of men trained and experienced in politics. Mr. Bernard M. Baruch, of New York, contributed funds to run the Institute for three years. Scholars and statesmen from abroad lecture at the conferences, led by professors of the higher educational institutions. The first conference was held at Williamstown, July 29 to August 27, 1921. The subject was *International Relations*, discussed from all sides, and there was also discussion of wars, and how to avert them. Lectures: *International Relations*

of Old World States, by Viscount James Bryce; *Russian Foreign Relations*, by Baron Korff of Russia; *The Essential Factor in International Relations*, by Professor Viallate of France; and others. The second session of the Institute was held July 27 to August 26, 1922, when the discussion was on *International Relations of Central and Eastern Europe, and Far East and Latin American Problems*. The third session was held in July and August, 1923.

POLK, FRANK LYON (1871), an American lawyer; *b.* at New York City; *s.* of Dr. William M. and Ida A. Lyon Polk. He was educated at Croton School and at Yale and Columbia Universities. After studying law at the latter institution, he began the practice of law in New York City, in 1897. From 1915-19, he was counselor for the Department of State, Washington, during which time he acted as Secretary of State in the absence of Sec. Lansing, Dec. 4, 1918 to July 18, 1919. In 1919, he was appointed Commissioner Plenipotentiary of the United States to Negotiate Peace, and was head of the American delegation to the Peace Conference at Paris, after which he served under the Secretary of State.

POLK, JAMES KNOX (1795-1849), Eleventh President of tne United States; *b.* in Mecklenburg co., North Carolina, November 2, 1795; *d.* in Nashville, Tennessee, June 15, 1849. Graduating from the University of North Carolina, he subsequently moved to Tennessee and studied law under Felix Grundy, joining the bar in 1820, and practiced in Columbia, Tennessee. In 1823, he was elected to Congress and was for 14 years a member of the House; speaker, 1835 and 1837, and distinguished as a strong Jacksonian Democrat. The leader of his party, he had to fight the strong opposition of Henry Clay. Elected governor of Tennessee in 1838, he was defeated when he ran again, in 1841 and 1843. He favored the annexation of Texas. Van Buren's uncertain position on this question caused him to lose prestige in the South, and at the Baltimore convention Polk was nominated for President. The result of the election was Polk, 170; Henry Clay, 105. In spite of the strong opposition of Clay, Calhoun, and Webster, his administration was successful. Notable features were the passage of the Walker Act, in 1846, which reduced the duties on imports, the establishment of an independent treasury system, the settlement of the Oregon boundary question, the annexation of Texas, the compromise agreement that the 49th degreee north latitude should constitute the boundary between British and United States possessions. The annexation of Texas led to the Mexican War (*q.v.*), resulting in the defeat of the Mexicans and the ceding of California to the United States. The accession of new territory revived controversy on the extension of slavery, which was not settled when Polk left office. He favored Lewis Cass as the nominee of his party for president, but Van Buren and his friends united with the Liberty Party, and founded the Free Soilers, who defeated Cass and the Democrats. Polk retired to his home in Nashville, and *d.* a few months after the election of General Taylor.

POLK, LEONIDAS (1806-1864), an American bishop and Confederate soldier; *b.* in Raleigh, N.C. He graduated from West Point, but instead of entering the army, studied theology; was ordained an Episcopal priest; and in 1838 became missionary bishop of the Southwest Indian Territory, Alabama, Mississippi, and Louisiana. In 1841, he became Bishop of Louisiana, and was responsible for the establishment of Sewanee University, and the University of the South. At the outbreak of the Civil War, he was commissioned a major-general in the Confederate Army; lead a corps at Shiloh and Corinth, then joined Johnson against Sherman's march to the sea, where he was killed in action.

POLLACK, LYTHE (*Gadus pollachius*), handsome green member of Cod family, without barbel and with projecting lower jaw; common inshore amongst rocks on Brit. coasts; used for food.

POLLEN, the male fertilizing cell of flowering plants, formed in the P. sacs of the anther. It is a rounded or polygonal cell, and contains a dense granular protoplasm, and its outer surface is often covered with oil; its color is generally yellow, but sometimes blue or red; when it reaches the stigma it germinates, and the P. tube penetrates to the ovary, which it fertilizes.

POLLENTIA, modern **POLLENZA** (44° 25′ N., 8° E.), ancient town, on Taranus, Luguria, Italy.

POLLINATION, the transference of pollen grains to the ovules, in Gymnosperms, or to the receptive part of the carpels in Angiosperms, is a necessary preliminary to fertilization. This may be accomplished by the wind (*anemophily*), by animals (*entomophily, ornithophily*), or by water (*hydrophily*); of these the first is almost certainly the most primitive. Among the best-known anemophilous types are Coniferae (*Pinus*), catkinate forms (alder, birch, hazel), and grasses, all characterized by

absence of bright coloration, odor, or honey, by production of vast quantities of light pollen, and by provision of a large stigmatic surface for its collection. Insect-pollinated (*entomophilous*) flowers are usually attractively colored and possess nectar; many have an agreeable scent (*e.g.*, lavender).

POLLIO, GAIUS ASINIUS (76 B.C.-*c.* 5 A.D.), Rom. orator, poet, and soldier; patron of Vergil and Horace. Vergil's fourth and eighth eclogues were addressed to him. His orations, tragedies, and histories are no longer extant.

POLLOCK, CHANNING (1880), author, dramatist; *b.* at Washington. In 1897, graduated from a military academy in Virginia; dramatic critic on two Washington papers from 1898-1900; press representative for a large theatrical producer from 1900-1904; in the summer of 1902, managed the Woman's Exhibition at Madison Square Garden; in 1904-1906, press representative for another theatrical concern; retired to engage in dramatic writing; dramatic critic for three magazines from 1905-1919; in 1904-1906, founded and published a magazine. Author of (books): *Behold the Man, 1900*; *Stage Stories, 1901*; *The Footlights—Fore and Aft, 1909*. (Plays): *A Game of Hearts, 1900*; *The Pit* (dramatization), *1900*; *Napoleon the Great, 1901*; *In the Bishop's Carriage* (dramatization), *1902*; *The Little Gray Lady, 1903*; *Clothes* (in collaboration with Avery Hopwood), *1906*; *The Secret Orchard* (dramatization), *1907*; *The Traitor, 1908*; *Such a Little Queen, 1909*; *The Inner Shrine* (dramatization), *1909*; *The Red Window, 1911*; *Hell, 1911*; *My Best Girl, 1912*; *The Beauty Shop, Her Little Highness, 1913*; *A Perfect Lady, 1914*; *Ziegfeld Follies of 1915, 1916*; *The Grass Widwo, 1917*; *Roads of Destiny, 1918*; *The Crowded Hour, 1918*; *The Sign on the Door, 1919*; *Ziegfeld Follies of 1921*.

POLLOKSHAWS (55° 50′ N., 4° 18′ W.), town, Renfrewshire, Scotland; incorporated in Glasgow, 1912; cotton-spinning and weaving. Pop. 13,000.

POLL-TAX, the compulsory contribution from each person of a portion of his wealth at the demand of the government. It is a tax per head, irrespective of income or property, and the levying of it in England in the XIV. cent. was the immediate cause of the Peasant Revolt, 1381. A Poll-Tax is still collected in some of the states, but most have abolished it.

POLO, equestrian game, popular in almost all English-speaking lands; played for many cent's in Oriental countries, Persia, Tibet, Japan, under similar rules; first played by Europeans in Calcutta, 1863; spread with extraordinary rapidity. Except that it is played on horseback, P. closely resembles hockey (*q.v.*); stick used is about four feet long with 8-inch cross-head; dimensions of field, 300 by 200 yards; distance between goal-posts, 22 ft.; four players on each side; height of ponies must not exceed 14 hands. These animals, when well trained, exhibit an almost human intelligence and command high prices.

POLO, MARCO (*c.* 1254-1324), Venetian traveller; when 17 years old accompanied his *f.* and *uncle* on journey to China (Cathay), where they had previously penetrated on trading expedition and had been kindly received by Kublai Khan, who had asked them to return bringing with them a number of European teachers and priests. The route followed was across Khorasan, over Pamir plateau and across Desert of Gobi, of which P. gives a graphic description. Kublai became attached to P. and entrusted him with various diplomatic and public duties; was unwilling to let him return to Europe, but fortunately P. was sent in retinue of the bride-elect of the Khan of Persia, and reached Europe, 1295; took part in war between Venice and Genoa, 1298; captured and imprisoned; told story of his journeyings to fellow-prisoner, Rusticiano of Pisa, who wrote them down. The work is in two parts: a personal prologue giving P's reasons for journey, and a description of various states of Asia with special reference to dominions of Kublai Khan.

POLONIUM, the first radio-active substance to be recognized by M. and Mme. Curie, in 1898. It was named after Poland, Mme. Curie's native country. It is found in combination in pitch-blend.

POLONNARUWA (8° N., 80° 59′ E.), ruined city; ancient capital of Ceylon.

POLOTSK (55° 29′ N., 28° 47′ E.), town, Vitebsk, Russia, at junction of Volota and Dvina; taken by Russians from Poles, 1579 and 1685. Pop. 21,000.

POLOTAVA.—(1) (50° N., 34° E.), government, S.W. Russia; level and undulating; drained by Dneiper; very fertile; one of leading agricultural provinces of Russia; distilleries, flour-mills, tobacco factories; several important fairs. Pop. 3,589,100. (2) (49° 33′ N., 34° 38′ E.), capital of above, on Vorskla; flour-mills. Pop. 61,300.

POLYÆNUS, 'THE MACEDONIAN' (fl. II. cent. B.C.), rhetorician;

collected *Strategemata*, or maxims of strategy, which he dedicated, *c.* 163, to Marcus Aurelius and Lucius Verus.

POLYANDRY. See POLYGAMY.

POLYANTHUS, flower possibly evolved from primrose, from which it differs in having the umbels carried on a stalk.

POLYBIUS (*c.* 204-122 B.C.), Gk. historian; *s.* of Lycortas of Megalopolis. P. won friendship of Scipio the younger, through whom he obtained access to Roman archives; returned to Megalopolis, 151, but spent little time in his native city; joined Scipio's African expedition, 147, and saw Carthage destroyed, 146; returned to Greece and negotiated with Romans for merciful terms for revolted cities of Achaean League; travelled with Scipio to Egypt, and in 134, accompanied him to Spain to reduce Numantia; at some time visited Gaul and Atlantic coast. Five of forty books of history remain, and some fragments.

POLYCARP (69-155 A.D.), one of so-called 'Apostolic Fathers'; little known of his life, but he must have been bp. of Smyrna for about 50 years. Irenaeus (*q.v.*) relates that when a boy he had listened to the discourse of P., who had conversed with St. John. An elaborate account of his martyrdom and heroism has been preserved in the *Letter of the Church of Smyrna.*

POLYCRATES OF SAMOS (*fl. c.* 500 B. C.), one of the most powerful of the Greek tyrants. Having established a tyranny at Samos, he collected a fleet, mastered the Ægaean, and by ubiquitious piracy amassed a great fortune.

POLYGAMY, custom by which a man may have several wives; distinguished from Polyandry, the possession of several husbands by a wife; allowed among people of India and Africa and all Muhamadans; in U. S. A. it is punishable as bigamy; the Mormons of U.S.A abolished bigamous marriage in 1890.

POLYGENIST, a believer in the theory that living things developed from more than one origin.

POLYGLOT, the technical name for a book which contains parallel versions of the same text in various languages. P. editions of the Bible are common. The Genoa Psalter, 1516, embraces Hebrew, Latin, Greek, Chaldee, and Arabic.

POLYGON, a plane figure of many angles and sides; usually restricted to figures of more than four sides. P. of five sides is termed a *pentagon*, of six sides a *hexagon*, and so on.

POLYGONACEÆ, herbaceous dicotyledons, with mainly trimerous, though occasionally (*Polygonum*) partly pentamerous floral symmetry; leaves characterized by possession of a membranous sheathing stipule termed the ochrea; includes rhubarb, dock, and sorrel.

POLYHEDRON, a solid bounded by many faces or planes. Polyhedra are classified according to number of *faces.* If faces are similar and equal regular polygons, solid is a regular P. Only five regular polyhedra exist, as is easily proved by examining the number of ways in which a solid angle may be formed out of the plane angles of various regular polygons, remembering that the sum of the plane angles forming a solid angle is less than four right-angles.

POLYMORPHA, a sub-order of beetles distinguished by their clubbed antennae, serrate along inner margin; include whirligig beetles (*Gyrinidae*), carnivorous forms, with paddle-like hind-limbs, which perform many dances on the surface of ponds; the carrion and burrying beetles (*Necrophorus*), the latter known for their habit of digging a grave beneath small dead vertebrates, so that they may afterwards enjoy an undisturbed feast; the familiar lady-birds (*Coccinellidae*), valuable on account of the plant-destroying insects they devour; the borers (*Anobium*), the larvae of which bore into wood; they include the so-called 'weevil', which is responsible for weevily ship biscuits; the larva of *A. paniceum*, also known as the book-worm; the cause of 'worm-eaten' furniture (*A. striatum*); 'death watches'; click beetles (*Elateridae*), so-called because when lying on their backs they can, with a click, jerk themselves in the air. The larvae of some are known as 'wire-worms.' American fire-flies (*Pyrophorus*) belong to this family. Amongst Malacodermidae the phosphorescent glow-worms and European fire-flies (*Luciola*) are placed.

POLYNESIA, term now usually confined to the South Sea islands westward, roughly, of a line drawn from New Zealand through Samoa to Hawaii and extending from about 120° to 180° W. Besides New Zealand, the more important are Tonga (Friendly Islands), Tubuai (Austral Islands) with Rapa or Oparo; Cook or Hervey; Tahiti (Society Islands); Paumotu or Tuamotu (Low Islands), with Gambier; Marquesas; Samoa (Navigator's Islands), with the outlying Ellice (Fanfute) group; Toke-

lau (Union Islands); Phoenix; Manahiki (Pernhyn); and Hawaii (Sandwich Islands). For details, see separate articles on the principal islands, which are inhabited by Kanakas. See MAP E. INDIES.

POLYOSES. See CARBOHYDRATES.

POLYP (Lat. *polypus*, from Gk. *polupous*, many-footed), name applied on account of their many tentacles to individuals, whether solitary or colonial, belonging to the groups Hydrozoa and Actinozoa of the stinging animals, Coelentera. 'The Polyps' was once used as a name for the Hydroid class of Zoophytes.

POLYPLACOPHORA, a sub-class of Gasteropoda.

POLYPTERUS, one of the two living genera of Crossopterygian fishes, found only in rivers of W. Tropical Africa. Nine species of P. are recognized, the best known being the Bichir (*P. bichir*). They live on muddy bottoms, rising occasionally to gulp air, and are estemed as food.

POLYPUS, a genus of Cephalopoda.

POLYPUS, pendulous, non-malignant overgrowth of mucous membrane, occurring in the nasal passages, uterus, intestine, and other situations; removed from the nose and uterus by twisting and tearing through the pedicle.

POLYTHEISM, belief in many gods' as opposed to monotheism or atheism' It is a necessary stage in the evolution of the religious spirit, and in certain of the great nations of antiquity, such as Assyria, Babylonia, Rome, and Greece, is to be found in a highly developed form. The same state exists in modern India. All these polytheistic systems arose from a fusion or union of the deities of different clans and tribes. Many passages in the O.T. show how difficult it was for the Israelites to free themselves from polytheistic practices.

POLYZOA, or **BRYOZOA, SEA MOSSES, ETC.,** a phylum or subkingdom of the animal kingdom, including small seaweed-like colonies commonly cast on shore after a storm. The colonies may be flat and encrusting, spread over a surface of seaweed, like the Sea-Mat (*Flustra*), or growing like miniature bushes or trees. This appearance is due to an external skeleton (really the cuticle), usually whitish on account of the lime it contains, and sometimes so massive and solid that it resembles coral (*Retepora, Porella*). The animals themselves are sheltered by small cups in the skeleton, within which they can altogether withdraw.

POMBAL, SEBASTIÃO JOSE DE CARVALHO E MELLO, MARQUESS OF (1699-1782), Portug. diplomatist and statesman; reorganized finances, founded industries, encouraged colonization; remedied distress after Lisbon earthquake, 1755; put down revolts and expelled Jesuits.

POMEGRANATE (*Punica granatum*), tropical tree which bears a fruit with an extremely tough leathery pericarp. This is packed with a large number of red or purple seeds with succulent coats. The fruit, is about the size of an orange. The tannin found in the rind is used in the manufacture of morocco leather.

POMERANIA, POMMERN (*c.* 53° 50′ N., 15° E.), coast province, Prussia; area, 11,631 sq. miles; surface flat, forming part of great N. German plain; E. part has belonged to Brandenburg since 1648, whole to Prussia since 1815; capital, Stettin. Pop., 1920, 1,787,193.

POMERANIAN DOGS. See DOG FAMILY.

POMERENE, ATLEE (1863), a United States senator; *b.* at Berlin, Holmes co., Ohio; *s.* of Dr. Peter P. and Elizabeth Wise Pomerene. He was educated at Princeton University and at Cincinnati Law School. He was admitted to the bar in 1886, and afterwards engaged in the practice of law at Canton, where he was city solicitor from 1887-91. He was prosecuting attorney of Stark co., Ohio, from 1897-1900, and after holding various other important polical positions was elected lieut.-governor of Ohio, in 1910, and United States senator the following year for the term of 1911-1917, to which office he was re-elected for the term of 1917-23. He was defeated for re-election in 1922.

POMONA, a banking city and health resort of Los Angeles co., California, in the San Bernardino valley, 2 m. from Spadra, with extensive fruit, vegetable and wine industries, and trade in packing and canning. Pomona College (open in 1888) is near by. Pop. 1920, 10, 210.

POMONA, MAINLAND (59° N., 3° 10′ W.), largest of Orkney Islands; contains towns of Kirkwell and Stromness. Pop. 15,000.

POMPADOUR, MARQUESE DE JEANNE ANTIONETTE POISSON LE NORMAND D'ÉTIOLES (*c.* 1721-64), mistress of Louis XV.; paternity claimed by Poisson and Le Normand; brought up by latter; *m.* Le Normand

d'Etioles, 1741. She set herself to win the king; laden with riches; center of literary coterie; ruled France till death.

POMPEII (40° 45′ N., 14° 30′ E.), former town, Italy, at foot of Mt. Vesuvius, on Bay of Naples; said to have been founded by Oscans in late VII. or early VI. cent. B.C.; captured by Romans, 80 B.C., after belonging in turn to the Etruscans and Samnites. For about 160 years P. was a prosperous Rom. town and a favorite seaside of the upper classes; but in 79 A.D. it was overwhelmed by volcanic ashes during the historic eruption of Mt. Vesuvius, which destroyed also the neighboring town of Herculaneum. For cent's it was entirely lost sight of, but in 1592, some remains were discoverd by Fontana when constructing an aqueduct here; and a century and a half later these were realized to be a part of P. Excavations were begun, in 1748, and since 1870, have been carried on with great regularity, so that now a large part of the town is exposed to view. It is regularly laid out and surrounded by walls, in which are eight gates. In the W. is the Forum, surrounded by colonnades (except in the N.) and by various important buildings; these include—the temples of Jupiter, Vespasian, and Apollo on the N., E., and W., respectively; the Macellum or market, the shrine of the Lares, and the building of Eumachia on the E., several halls on the S., and the great Basilica on the W. In S. of town is another open space called the Triangular Forum, containing an old Doric temple, and with the Great and Little Theatres and the Gladiator's Barracks on the E.; while to N. of Great Theatre are Temples of Æsculapius and Isis. Other temples are those of Fortuna Augusta and Venus Pompeiana to N. and S.W. of Forum respectively. There are thermae to N. of Forum and in the E. part of the town; and the great amphitheatre stands in S.E. corner just within the walls. Private houses include the villas which belonged to Cicero and Diomedes. Great number of beautiful works of art have been discovered, including wall-paintings and statues.

POMPEIUS, POMPEY, Rom plebeian *gens*; noted members were—(1) Gnaeus, consul, 89, *f.* of (2) Gnaeus Pompy the Great (106-48 B.C.), who aided Sulla against Marius; repelled Lepidus, 77; defeated Marians in Spain, 76-71; put down revolt of Spartacus,and became consul, 71. Sent with extraordinary powers to suppress piracy, 67, he cleared the Mediterranean in 40 days; conquered Mithradates, and annexed Syria and Palestine, 66-63; finding bitter jealousy in Rome, formed coalition ('first triumvirate') with Caesar and Crassus; defeated by Caesar at Pharsalus, 48; murdered in Egypt by Achillas. His *sons*, Gnaeus and Sextus, were defeated by Julius Caesar at Munda, 45.

POMPONAZZI, PIETRO (1462-1525), Ital. philosopher; studied med. and philosophy at Padua; distinguished Aristotelian scholar; denied that immortality follows from Aristotle's doctrines.

PONANI (10° 47′ N., 75° 58′ E.), seaport, at mouth of Ponani, Madras, India. Pop. 10,500.

PONCE (18° N., 66° 41′ W.); seaport, Porto Rico; sugar. Pop., 1920, 41,560.

PONCE DE LÉON, JUAN (*d.* 1521), a native of Leon, accompanied Columbus in his second voyage in 1493, and was appointed lieutenant to the governor of Hispaniola. In 1508, having received intelligence from the natives that the neighboring island of Boriquem, or Porto Rico, abounded with gold, he succeeded in effecting its subjugation, after many hard-fought battles; but he was superseded in the command of the conquered country. He next appears to have conceived the idea that there was yet a third world to be discovered; but as he was then fast advancing in life, he decided to sail first to a certain island of the Bahama group, called Bimini, where according to a tradition, there was a fountain possessing the power of restoring youth. He did not, however, discover either the island or the fountain but came in sight of what he supposed to be an island, which he called 'Pascua Florida.' P. took possession of the country in the name of Ferdinand and Isabella. In a subsequent expedition he came upon the W. coast of Florida where he made a descent, but was fatally wounded by the Indians.

PONCHO, a kind of cloak with a hole for the head, worn by the Spaniards in some parts of S. America.

PONDICHERRY, PONDICHÉRY (11° 56′ N., 79° 53′ E.), capital, Fr India, on Coromandel Coast; chief industry, weaving. Pop. 50,000; territory, 185,000.

PONDOLAND, a part of the colony of Cape of Good Hope, Africa, annexed in 1894.

PONIATOWSKI, JOSEPH ANTHONY (1763-1813), Polish prince and patriot; commander-in-chief against Russia, 1792, and assisted in Napoleonic campaigns; appointed commander-in-chief of new duchy of Warsaw; distin

guished in last Napoleonic invasion of Russia.

PONIATOWSKI, STANISLAUS (1677-1762), Polish general and statesman; adopted by P. family; *f.* of King Stanislaus II. of Poland, Casimir, chancellor, Michael, abp., and Andrew, soldier, who was *f.* of Napoleon's marshal, P.

PONIATOWSKI, STANISLAUS (1754-1833), *nephew* of Stanislaus II. of Poland, during whose reign he held high civil and military office; secret adviser of of Tsar Paul I.; *f.* of Prince Joseph Michael Xavier Francis John, 1816-73, author of operas.

PONSONBY, JOHN (1713-89), Irish politician; one of 'undertakers' who managed Ireland, 1756-67; *s.*, William, cr. baron, 1806; *s.*, George, lord chancellor of Ireland, 1806.

PONTA DELGADA (37° 40′ N., 25° 32′ W.), chief town, island of Sao Miguel, Azores. Pop. 18,500.

PONT-À-MOUSSON (48° 54′ N., 6° 2′ E.), town, on Moselle, Meurthe-et-Moselle, France; blast-furnaces. Pop. 14,000.

PONTANUS, JOVIANUS (1426-1503), Ital. humanist and poet; *b.* at Cerreto, in Spoleto; succeeds best in Lat. verse, *e.g.*, *Urania, De Hortis Hesperidum, De on Cjugale Amoer.*

PONTARLIER (46° 54′ N., 6° 21′ E.), town, Doubs, France, on Doubs; absinthe distilleries. Pop. 9,000.

PONT-AUDEMER (49° 20′ N., 0° 29′ E.), town, on Rille, Eure, France. Pop. (commune) 6,300.

PONTECORVO (41° 28′ N., 13° 42′ E.), town, on Garigliano, Caserta, Italy. Pop. (commune) 12,000.

PONTCHARTRAIN LAKE, a lake in Louisiana 5 miles from New Orleans. It is 40 miles long, and 25 wide.

PONTEFRACT, POMFRET (53° 42′ N., 1° 19′ W.), town, W. Riding, Yorkshire, England; market gardens and nurseries; trades in grain; manufactures Pomfret cakes (P. lozenges) from liquorice. Pop., 1920, 16,763.

PONTEVEDRA.—(1) (42° 30′ N., 8° 30′ W.), maritime province, Spain, in Galicia; mountainous. Pop., 1920, 515,984. (2) (42° 28′ N., 8° 35′ W.), seaport, capital of above, on Bay of P.; trade in grain. Pop. 25,000.

PONTIAC, a city of Michigan, in Oakland co., of which it is the county seat. It is on the Grand Trunk, and the Pontiac, Oxford and Northern railroads, and on the Clinton River. It is in the midst of a picturesque lake region and is famous for its hunting and fishing. It has also an extensive trade in wool and farm products. Its industries include the manufacture of automobiles, wagons, farm machinery, paints and varnishes, flour, etc. It is the seat of the State Hospital for the Insane, and has a public library. Pop., 1920, 34,273.

PONTIAC a city of Ill. in Livingston co. It is on the Vermilion River. It has manufactories of shoes and implements. Pop. 1920, 6,664.

PONTIAC, a chief of the Ottawa Indians, noted on account of his leadership in the 'Pontiac Conspiracy.' When at the close of the last French War, England tried to take possession of the territory W. of the Alleghenies and N. of the Ohio, trouble with the Indians in that region at once arose. The French found here their opportunity for revenge for the losses they had sustained, and in the chief, Pontiac, a ready accomplice. Having won over to his scheme many other tribes, he made his attack on the British forts W. of the Alleghenies, capturing twelve out of eighteen. Two years of bloody warfare followed, resulting in the complete defeat of the Indians.

PONTIAC'S WAR.—Pontiac, an Ottawa Indian chief, and leader of confederate tribes of the Ohio Valley and lake regions, planned to drive the English out of America while remaining friendly to the French. In May, 1763, all Indians were to attack the forts in their neighborhood, there being 14, from the Pennsylvania frontier to Lake Superior. The attacks were made as planned, and the Indians captured all forts but Niagara, Pitt, Ligonier, and Mackinaw. At Mackinaw the garrison was massacred Pontiac failed at Detroit and besieged the fort for five months, the mostfamous incident being the sortie of the garrison and action at Bloody Ridge, July 31, 1763, repulsed by Pontiac. Forts Pitt and Ligonier were relieved by Colonel Bouquet, who crushed the Indians at Bushy Run. Detroit received reinforcements. Pontiac's Indians deserted; peace between England and France destroyed his hope of help from France; he raised the siege of Detroit, and in 1765, treated for peace.

PONTIFEX (cf. Pontiff), Rom. high priest. Rom. college of priests was composed of *pontifex maximus, rex sacrorum, flamines, pontifices minores,* and vestal virgins.

PONTINE MARSHES (41° 25′ N., 13° 5′ E.), large marshy region, Rome

province, Italy, extending along Mediterranean coast.

PONTIVY, formerly **NAPOLÉONVILLE** (46° 5′ N., 2° 59′ W.), town, on Blavet, Morbihan, France. Pop. 9,500.

PONT-L'ABBÉ (47° 50′ N., 4° 10′ W.) town, Finistere, France, on inlet of sea; exports vegetables. Pop. 6,500.

PONTOISE (49° 3′ N., 2° 6′ E.), town, Seine-et-Oise, France; ancient *Briva Isarae*; trade in grain; former capital of Fr. Vexin. Pop. 8,500.

PONTOON signifies a floating dock or, more strictly, a floating bridge. The floating bridge has been used for military purposes from very ancient times, early examples being that thrown across the Bosphorus by Darius, and the one formed by Xerxes over the Hellespont, of which Herodotus has given a full description.

PONTREMOLI (44° 23′ N.; 9° 52′ E.), town, Massa e Carrara, Italy. Pop. (commune), 14,500.

PONTUS, geographical division of Asia Minor. Originally the Black Sea, and its coasts were all named P. by the Greeks, but in Macedonian period term meant district S. of Euxine, N. of Anti-Taurus and Paryadres, E. of Bithynia, and W. of Armenia. Kingdom was founded early IV. cent. B.C., by Mithradates I., from dominion of Seleucidae. Mithradates VI. was defeated by Pompey, 65 B.C., when P. was annexed to Bithynia; Roman province of Pontus Polemoniacus formed, 63 A.D.

PONTYPRIDD (51° 36′ N., 3° 21′ W.), town, Glamorganshire, Wales, at Junction of Rhonadda and Taff; iron works; coal and iron mines. Pop. 43,000.

PONY. See under HORSE FAMILY

POOLE (50° 43′ N., 1° 58′ W.), seaport, Dorsetshire, England; flourishing coasting trade; china- and pipe-clay; oyster beds. Pop., 1921, 43,661.

POODLE a breed of dogs which first appeared in the 17th century. The best Ps. are jet black, like the Russian, or pure white, like the German. Their coat is a mass either of short curls or of long ropy ringlets.

POOLE WILLIAM FREDERICK (1821-94), an American librarian, was librarian at Boston Athenaeum from 1856-69, and from 1873 till his death had charge of libraries in Chicago. In 1853, 1882, 1888, etc., he published an index of periodical literature, which has been continued since his death.

POONE, PUNA (18° 31′ N., 73° 55′ E.), city, Bombay, India; capital of Deccan division, and of P. district; was capital of the Mahrattas; annexed by Britain, 1817; important military station; residence of gov., June-Sept.; contains two colleges and numerous schools; silk, cotton, and jewelry manufactures. Pop., 1921, 176,671.

POORE, BENJAMIN PERLEY (1820-1887), an American journalist and writer; *b.* in Newburyport, Mass. He began his career as a printer, from which he drifted into journalism. In 1838, his father purchased for him *The Southern Whig*, which he edited for three years. Later he became editor of the *Boston Bee and Sentinel*, and, after 1854, was Washington correspondent for the *Boston Journal*, holding this position for thirty years. He write *The Rise and Fall of Louis Philippe, 1848*; *The Conspiracy Trial for the Murder of President Lincoln, 1865*; and *Reminiscences of Sixty Years in the National Metropolis, 1886.*

POORE, HENRY RANKIN (1859); American artist; *b.* in Newark, New Jersey, March 21, 1859. Graduating from the University of Pennsylvania, in 1883, he studied art at the Pennsylvania Academy of Fine Arts and the New York Academy of Design, and was a pupil of Peter Moran, Lumenais, and Bouguereau. His pictures generally represent figures and animals. He was awarded prizes by the National Academy of Design, and the American Art Association. Medals at the Buffalo and St. Louis expositions; gold medal International Exposition at Buenos Aires, Argentine; silver medal Panama Exposition, 1915; A.N.A. (Associate National Academy) Member of the International Society of Arts and Letters. Author of *Pictorial Composition and the Critical Judgement of Pictures, 1903*; *The Conception of Art*, *The New Tendency in Art.*

POORE, RICHARD (*d.* 1237), bp. of Chichester, 1214; Salisbury, 1217; Durham, 1228; commenced building of Salisbury Cathedral.

POPAYAN (2° 23′ N.; 76° 35′ W.), town (and department), Colombia, on Cauca; founded, 1537; bp's see; cathedral and univ. Pop. 19,000; (district) 190,000.

POPE. See PAPACY.

POPE, ALEXANDER (1688-1744); Eng. poet; *b.* London; educated privately; showed poetic bent from an early age—'I lisped in numbers, for the numbers came'; his first publication was *Pastorals*, written in 1704, which appeared in 1709; his *Essay on Criticism*,

1711, in spite of a want of clearness in some of its theories, is a marvel of epigrammatic brilliance, and remains the best Eng. statement of the doctrines of classicism; the *Rape of the Lock, 1712*, a mock-heroic poem, won him instant fame; in 1717 he brought out an ed. of his works, including, in addition to those mentioned, *The Temple of Fame, Epistle of Eloisa to Abelard, Elegy to the Memory of an Unfortunate Lady, Imitations of Character*, and several translations. For the next ten years he was occupied chiefly in translating, and his *Iliad, 1715-20*, and *Odessy, 1725-6*, were the fruits of his labors. Having brought out an ed. of Shakespeare, 1725, which was adversely criticised, Pope retaliated on his critics with the *Dunciad, 1728*. His great didactic poen, the *Essay on Man, 1732-4*, and the *Moral Essays, 1731-5*, undertaken at the suggestion of Bolingbroke, are only fragments of his great scheme. His philosophy was borrowed from Bolingbroke, and the *Essay on Man* remains merely an 'exquisite mosaic.' His latest works comprise *Imitations of Horace, 1733-7*; *Epistle to Dr. Arbuthnot, 1735*, and *Epilogue to the Satires, 1738*. He also pub. his *Correspondence, 1737*.

POPE, JOHN (1822-92), Amer. general; successful as commander in Civil War, 1861, and early 1862; assumed command of army of Virginia in boastful spirit; signally defeated at *Bull Run*, Aug., 1862.

POPERINGHE (50° 52′ N., 2° 43′ E.), town, W. Flanders, Belgium; wool, linen, hop gardens. Pop. 12,000.

POPHAM, SIR HOME RIGGS (1762-1820), Brit. rear-admiral; took part in occupation of Cape of Good Hope, 1806.

POPISH PLOT. See Oates, Titus.

POPLAR (*Populus*), a genus of trees allied to willows (*Salix*), and included with them in Salicacaea; several species —*P. tremula* (aspen), *P. fastigiata* (Lombardy P.), *P. alba* (white P.), and *P. nigra* (black P.) being the best known. The inflorescences take the form of catkins, the carpellary flowers being wind-pollinated. The timber, though used for scaffolding, is not of great value.

POPLAR, borough, on Thames, three miles E. of St. Paul's, London. Pop., 1921, 164,100.

POPLAR BLUFF, a city of Missouri, in Butler co., of which it is the county seat. It is on the Iron Mountain Railway. Its industries include an adding-machine factory, and stave works. Pop., 1920, 8,042.

POPLIN (Fr. *popeline*), a dress fabric, used also for upholstery, with a warp of silk and a weft of worsted which give a corded structure. Huguenot refugees introduced its manuf. into England, but it is now chiefly made in Dublin.

POPOCATEPÉTL (19° N., 98° 40′ W.), volcano, state of Puebla, Mexico; one of highest peaks in N. America (17,880 ft.); immense crater yields sulphur.

POPPY (*Papaver rhaeas*), a common cornfield weed; *P. somniferum*, the opium P. See Opium.

POPULAR SOVEREIGNTY, or **SQUATTER SOVEREIGNTY.**—An interchangeable term as used by some American historians, meaning the right of people in a territory to regulate their affairs without the interference of Congress. Properly 'popular sovereignty' can exist only in organized territory and 'squatter soveriegnty' in unorganized territory occupied by 'squatters.' The term 'popular sovereignty' was first used in the discussion over the extension of slavery in the new territory acquired from Mexico. The doctrine was accepted by the South as true to American traditions and self-government, and as saving discussion in State and Congress. The compromise measures of 1850 providing for the organization of New Mexico and Utah as territories, made no reference to slavery. In 1854, the Kansas-Nebraska Bill (*q.v.*) adopted the principle for the government of those territories. The South later repudiated the doctrine as endangering slavery, claiming that neither Congress, nor territorial authorities could legislate against slavery, but must protect property, such as slaves, in slave states. The Dred Scott decision (*q.v.*) supports this view. The discussion on popular sovereignty divided the Douglas Democrats of the North, and extremists South, and led to a wide split later

POPULATION. See Census.

POPULISTS, or **PEOPLES PARTY**, an American political party, formed in 1890, that exercised considerable voting power during its brief span of life. It declined and became non-existent in the early years of the XX. cent., its demise being due to an alliance with the Democrats and to the enactment into law of much of its then radical platform by one or other of the older parties. In the national election of 1892, its ticket, headed by James B. Weaver for President, and James B. Field for Vice-President, received 22 electoral votes and a popular vote of 1,055,424. Previously it had carried the legislatures of Kansas

and Nebraska and exercised great weight with Democrats and Republicans in Congress in securing their pledges to support the populist platform. The latter included free and inlimited coinage of silver; abolition of the national banking system; issue of sufficient flat money to enable the country's business to be conducted on a cash basis, and the loan of such currency to the people at not more than two per cent per annum on non-perishable agricultural products; national ownership of all systems of transportation and communication; a graduated income tax; popular election of U.S. senators and judges; the adoption of the initiative and referendum in legislation; and the prohibition of alien ownership of land. In 1896 and 1900, the Populists supported Bryan. In 1904, their candidates for President and Vice-President, Thomas E. Watson, of Georgia, and Thomas E. Tibbles, polled 120,903 votes, but as the 1908 presidential election, with Watson again their nominee, the party could only muster 28,131 votes.

POPULONIUM (43° N.; 10) 30′ E.), ancient seaport, Etruria, Italy.

PORBANDAR (21° 37′ N., 69° 48′ E.), chief town, seaport, P. state, Kathiawar, Bombay, India. Pop. 25,000.

PORCELAIN. See POTTERY.

PORCH, in architecture, an exterior appendage to a church or other building, making a covered approach or vestibule to a doorway.

PORCIA.—(1) The *s.* of Cato Uticensis. She married L. Domitius Ahenobarbus, who *d.* at Pharsalia. (2) The *dau.* of the above Cato. After the death of her first husband, Bibulus (consul 59 B.C.) she wedded Brutus, Caesar's assassin. She was privy to the conspiracy.

PORCUPINE FISHES and **RABBIT FISHES** (*Diodontidae*), globular or oblong fishes, armed with long projecting spines, movable or immovable; found in all, but chiefly in tropical seas.

PORCUPINES, moderately large Rodents, protected by long, strong spines. The Common P. (*Hystrix cristata*) occurs in the countries round the Mediterranean Sea; the Tree P. (*Coendu*) is American.

PORDENONE (45° 57′ N.; 12° 40′ E.), town, Venetia, Italy; cotton-mills. Pop. (commune) 12,500.

PORDENONE, IL (1483-1539); the name adopted by an Ital. painter of religious subjects, from his birthplace, near Pordenone, in Venetia.

PORISM, name given by ancient geometricians to a certain class of mathematical propositions whose object was to find what conditions will render certain problems indeterminate.

PORGIES. See SEA BREAMS.

PORK. See PIG FAMILY; MEAT PACKING.

POROS (37° 30′ N.; 23° 30′ E.); small island, Greece, in Gulf of Ægina; ancient *Calauria.*

PORPHYRY (Gk. *purple*).—(1) (Petrology) hard stone, resembling granite and known also as *porfido rosso antiquo*; red, with green, black, or white variations; polished and used for ornamental purposes; composition; felspar, hornblende, and oxidized iron. (2) (Geology) term used in reference to any unstratified igneous rock containing felspathic crystals or other minerals, *e.g.*, felspar-P., claystone-P., porphyritic-granite, porphyritic-greenstone, quartz-P., sugite-P., etc.

PORPOISE. See DOLPHIN FAMILY.

PORSON, RICHARD (1759-1808); Eng. scholar; *b.* E. Ruston, Norfolk. His works include *Letters* on Hawkin's *Life of Johnson,* edition of plays by Æschylus and Euripides, *Adversaria* and *Tracts and Criticisms* (both posthumous).

PORT. See WINE.

PORT ADELAIDE (34° 52′ S.; 138° 35′ E.), the port of Adelaide, S. Australia, on Gulf of St. Vincent; silver- and copper-mining works. Pop. 21,000.

PORTADOWN (54° 26′ N.; 6° 27′ W.), town, on Bann, County Armagh, Ireland; textiles. Pop. 12,000.

PORTAGE a city and co. seat of Columbia co., Wisconsin., 90 m.N.N.W. of Milwaukee; manufactures hosiery, bricks, and flour. Pop. 1920, 5,582.

PORTAGE LA PRAIRIE (49° 57′ N.; 98° 20′ W.), town, Manitoba, Canada; trade in grain. Pop., 1921, 6,748.

PORTALEGRE (39° 14′ N., 7° 26′ W.), city, P. district, Portugal; bp's see; woolens. Pop. 12,000.

PORTALIS, JEAN ÉTIENNE MARIE (1746-1807), Fr. jurist; assisted Napoleon in framing *Code Civil.*

PORT ANGELES, a city of Washington. Pop. 1920, 5351.

PORT ARTHUR a seaport in Thunder Bay, Lake Superior, Ontario, Canada. It has excellent railroad facilities and ships grain, minerals and lumber. Pop. 15,000.

PORT ARTHUR. (38° 48′ N., 121° 20′ E.), fortified town, Liao-Tung peninsula, Manchuria (*q.v.*); Chin. name, *Lu-Shun- Kau*; taken by Japanese from Chinese, 1894; leased to Russia by China, 1898; surrendered by Russians to Japanese, 1905, after 11 months' siege; terminus of Trans-Siberian Railway. Pop. 151,000.

PORT ARTHUR, a city of Texas, in Jefferson co. It is on the Kansas City Southern, Texas and New Orleans railroads, and on several steamship lines and canals. It is a port of entry for the Sabine district, and is the center of an extensive oil producing and refining industry. Its other industries include rice milling and horticulture. There are several parks and pleasure piers. There is a Federal building and a hospital. Pop., 1920, 22,251.

PORT AUGUSTA (32° 35′ S., 137° 40′ E.), seaport, S. Australia, on Spencer Gulf; exports wool; large ostrich farm.

PORT-AU-PRINCE (18° 34′ N., 72° 20′ E.), capital and chief seaport, Haiti, on Gulf of Gonaives. Pop. 120,000.

PORT BLAIR (11° 41′ N., 92° 43′ E.), port, Brit. Indian penal settlement, S. Andaman, Andaman Islands. Pop. 18,500.

PORT CHESTER, a village of New York, in Westchester co. It is on the New York, New Haven and Hartford Railroad, and on Long Island Sound. It has foundries, boat works, gas stove works, boiler works, etc. There is a memorial hospital, library, and a park. Pop., 1920, 10,593.

PORTCULLIS (Lat. *porta*, gate, and Fr. *coulisse*, groove), a strong grating of timber or iron which was constructed to slide in vertical grooves in the joints of entrance gates; it was of Italian origin. The vertical bars were generally of iron or tipped with iron.

PORT ELIZABETH (33° 57′ S., 25° 37′ E.), seaport, and district, Cape Province, S. Africa, on Algoa Bay; college, library, museum, botanical garden, parks; important transit trade; exports wool, skins, feathers, mohair. Pop., 1921, 45,972; (white) 25,940.

PORTER, BRUCE (1865), artist; *b.* in San Francisco, California. Educated in California, France, and England. Since 1891, engaged in stained glass and mural painting. Designed the R. L. Stevenson Monument, in San Francisco. He did the mural decorations at various churches in different parts of California. Originator of the *Lark with Gelett Burgram* (bibelot). Founder, with Joseph Worcester, of Society for Helping Boys.

PORTER, DAVID (1780-1843), American naval officer; *b.* in Boston, February 1, 1780; *d.* near Constantinople, March 3, 1843. He joined the U.S. navy as a midshipman, in 1798, and was on the *Constitution* in the fight with 'L'Insurgents' in 1799. In the attack on Tripoli, he was taken prisoner when the *Philadelphia* was captured. During the War of 1812 he was active in destroying British shipping, and whalers in the Pacific. His ship, the *Essex*, was blockaded by two British war vessels in Valparaiso harbor. In making a dash to escape, the *Essex* was damaged by a squall, and he was forced to anchor near the town. Attacked by the British ships, he fought for two and a half hours before surrendering. Promoted commodore, in 1824, he was sent to destroy the pirates in the West Indies. His officer sent to investigate Fajardo, Porto Rico, was imprisoned by the Spanish. Porter forced them to surrender him and apologize. He was court-martialed for having exceeded his authority, and resigned, in August, 1826. He then entered the Mexican service, from which he resigned, in 1829. Appointed consul-general to the Barbary States, he was later *charge d' affairs* at Constantinople. Author of *Journal of a Cruise to the Pacific Ocean, 1815*; *Constantinople and its Environs, 1835*.

PORTER, DAVID DIXON (1813-1891), American naval officer; *b.* in Chester, Pennsylvania, June 8, 1813; *d.* in Washington, February 13, 1891. Joined the Mexican navy as a midshipman, in 1826, and captured on a ship engaged in preying on Spanish commerce; was imprisoned in Havana. Midshipman in U.S.N., in 1835, European station. In the Mexican War, he was commander of the *Spitfire*, and in the Civil War commander of the *Powhattan*, sent to relieve Fort Pickens. Promoted captain, 1861, of mortar fleet; he was with Farragut, in 1862, when he exploded 20,000 bombs in Fort Jackson and Fort St. Philip, below New Orleans, which enabled Farragut to capture the city. He fought at Vicksburg, and became acting rear-admiral, commanding the Mississippi squadron. In January, 1863, he helped Sherman capture Arkansas Post, and later ran the Vicksburg batteries, opened communication with Grant, and co-operated in siege of Vicksburg. Commissioned rear-admiral, he was with General Banks' Red River expedition, and commanded the North Atlantic blockading squadron, in 1864. With General Terry, the capture of Fort Fisher was made in January, 1865. Superintendent U.S. Naval Academy, 1865-1875. Author: *Incidents and Anecdotes of the Civil War, 1885*; *History of*

the Navy in the War of the Rebellion, 1887; and others.

PORTER, FITZ-JOHN (1822-1901), American soldier; *grandson* of Commodore David Porter; *b.* in Portsmouth, New Hampshire, June 13, 1822; *d.* in Morristown, New Jersey, May 21, 1901. Graduated at U.S. Military Academy, 1845; in Mexican War, was promoted captain at Moline del Rey; major after Chapultepec; garrison duty to 1849; assistant instructor artillery, West Point, 1854-1855; in the Civil War in command of department of Pennsylvania; colonel of 15th Infantry, May, 1861; brigadier-general, 1864; from August, 1861, to May, 1862, commanding a division for defence of Washington; assisted in seige of Yorktown; with 5th Army Corps at Mechanicsville and Gaine's Mill; brevetted brigadier-general for bravery at Chickahominy; commanded left flank at Malvern Hill; with 5th Corps under Grant, Army of Virginia; fought in the second Battle of Bull Rum; convicted and cashiered by general court-martial for disobeying order to attack. Sought review of case, and though Grant wrote and spoke in his favor, he was not exonerated officially until Congress acted, July 1, 1886. On August 5, of that year, he was appointed colonel of infantry, to rank from May, 1861.

PORTER, HAROLD EVERETT ('HOLWORTHY HALL') (1887); *b.* at Hyde Park, Massachusetts. In 1909, graduated from Harvard University; 1909-1910, with manufacturing department of a book publisher in Boston; from 1910-1916, with another book concern in New York, of which he was president, from 1915-1916. In World War as captain in the Air Service, and later detailed to office of the Secretary of War. Wrote a history in collaboration with two other men, of all types of United States; made engines and planes. Author of *My Imitation, 1913*; *Henry of Navarre, Ohio, 1914*; *Pepper, 1915*; *Paprika, 1915*; *Help Wanted, 1916*; *What he Least Expected, 1917*; *Dormie One, 1917*; *The Man Nobody Knew, 1919*; *The Six Best Cellars* (with Hugh Kahler), *1919*; *Egan, 1920*; *Aerial Observation, The Aerial Observer, The Balloon Observer*, and *The Army Corps Pilot, 1921*; *Rope, 1921.*

PORTER, HORACE (1837-1921), American soldier and diplomat; *b.* in Huntington, Pennsylvania, April 15, 1837; *d.* May 29, 1921. Educated at Lawrence Scientific School, Harvard, U.S. Military Academy, 1860; in the Civil War, captain, 1863, and lieut.-colonel and aid to Grant, in 1864; fought with distinction at Pulaski, Chickamauga, and the Wilderness, and in March, 1865, was brevetted brigadier-general. Assistant secretary of war, 1860; executive secretary to Grant, 1869-1873; president Pullman Car Company, N.Y., West Shore, E. Buffalo R.R., and Santa Fe R.R. Raised funds by private subscription to build Grant's Tomb, New York. At his own cost had the remains of Paul Jones removed from Paris, on April 7, 1905, transferred to the United States and interred at Annapolis, August 23, 1906. Author of *Campaigning with Grant, 1897*; and other works.

PORTER, JANE (1776-1850), Brit. novelist; was *b.* at Durham. She wrote many books in an exaggerated romantic style, but her best romance, *The Scottish Chiefs*, in spite of numerous faults, is a spirited and thrilling picture of the times of Wallace.

PORTER, NOAH (1811-92), an American philosophical writer; was a Congregational minister for ten years (1836-46), and for forty years (1846-86) was associated with Yale College, latterly (from 1871) as president. He wrote: *The Human Intellect, 1868*; and *Moral Science, 1885.*

PORTER, ROBERT PERCIVAL (1852-1917), American journalist and statistician; *b.* in Norwith, England, June 30, 1852; *d.* February 28, 1917. He came to the United States in early manhood, and joined the staff of the *Chicago Inter-Ocean*, subsequently preparing reports of the 10th United States census. Member of the Tariff Commission, 1882. He visited Europe for the *New York Tribune* and *Philadelphia Press* to study and report industrial and housing conditions on the Continent. With Frank Hatton, he founded the *New York Press*, in 1887; superintendent of the 11th census, 1890-1894; in 1904, he joined the staff of the *London Times*, and afterwards investigated social and industrial conditions in Japan, Cuba, and Porto Rico. Publications: *The West in 1880, 1882*; *Breadwinners Abroad, 1885*; *Free Trade Folly, 1886*; *Commerce and Industries of Japan, 1896*; *Industrial China, 1899*; *The Full Recognition of Japan, 1911.*

PORTER, WILLIAM SYDNEY ('O. HENRY') (1862-1910); *b.* in Greensboro, North Carolina, 1862; *d.* June 5, 1910. Educated at Texas academies, he was for a time on a cattle ranch, and then became reporter on the *Houston Post*. He next published a fiction weekly, *The Rolling Stone*, which he wrote mostly himself. He lived for a time in Central America, turning his experiences later into stories. After working as a drug clerk in Texas, he went to live in New Orleans, writing industriously, and send-

ing his stories all over the country. It was not, however, until he came to New York, in 1901, that his work found appreciation. He soon became the most popular story writer in the United States. *Cabbages and Kings* contains his stories of life in Central America, and *Heart of the West* and *Roads of Destiny*, of the West. But in New York City he found his best field. In addition to the works mentioned before, he published *The Four Million, 1906*; *The Trimmed Lamp, 1907*; *The Gentle Grafter, 1908*; *The Voice of the City, 1908*; *Options, 1909*; *Whirligigs, 1910*; *The Two Women, 1910*; *Strictly Business, 1910*; *Rolling Stones, 1912*. A complete edition of his works was published in 1912.

PORT GLASGOW (55° 56′ N., 4° 41′ W.), seaport, on Clyde, Renfrewshire, Scotland; shipbuilding yards, engineering works. Pop., 1921, 21,022.

PORT HOPE (43° 58′ N., 78° 20′ W.), town, port of entry, Ontario, Canada, on Lake Ontario; trade in lumber. Pop. 6,100.

PORT HURON, a city of Michigan, in St. Clair co., of which it is the county seat. It is on the Pere Marquette, and the Grand Trunk railroads, and on the St. Clair and Black rivers, at the foot of Lake Huron. It has an extensive trade with Canada. Its industries include the manufacture of fibres, corsets, lumber, flour, automobiles, and boilers. It has the shops of the Grand Trunk Railroad. The public buildings include a U.S. government building, public library, and a hospital. There are also several parks. Pop., 1920, 25,944.

PORTICI (40° 50′ N., 14° 20′ E.), town, fishing port, on Bay of Naples, Italy. Pop. 14,600.

PORT JACKSON (33° 52′ S., 151° 11′ E.), harbor, New South Wales, Australia; on its S. shore is Sydney (*q.v.*); naval station.

PORT JERVIS, a city of New York, in Orange co. It is on the Erie, and the New York, Ontario and Western railroads. The town is at the intersection of the boundary lines of New York, New Jersey, and Pennsylvania, and at the junction of the Neversink and Delaware rivers. Its industries include iron foundries, railroad repair shops, silk mills, boot and shoe factories, etc. There is an orphan asylum, an Elk's home, and a Federal building. Pop., 1920, 10,171.

PORTLAND, a city of Maine, in Cumberland co., of which it is the county seat. It is on the Boston and Maine, the Grand Trunk, and the Maine Central railroads, and on the Atlantic Ocean. There is direct steamboat connection with New York and Boston, and weekly steamship lines to Europe. Portland is well laid out along the peninsula in the harbor, which is protected by a massive breakwater. It is the largest city in Maine, and the most important industrially. It has over 700 manufacturing establishments, which include boot and shoe factories, sugar refineries, foundries, rolling mills, locomotive works, match factories, chemical, paint and oil works, meat packing establishments, etc. Formerly shipbuilding was an important industry, but it has now diminished. There are large interests in fishing and shell fish. Portland has a large wholesale trade, and is the distributing point for a large section of the state. It has many handsome public buildings, including a custom house, city hall, U.S. Marine Hospital, and the Maine General Hospital. It has also many points of historical interest, including Longfellow's home, the birthplace of Henry Wadsworth Longfellow, and many other houses which date back to the XVIII. cent. There are many philanthropic institutions, including Portland School for the Deaf, Old Men's Home, Old Ladies' Home, St. Elizabeth's Academy, etc. Portland was settled by the English, in 1632, and was burned by the Indians, in 1676. It was again burned by the French and Indians, in 1690, and was rebuilt in 1715. It was burned again by the English, in 1775, and was rebuilt in 1783. It became a city in 1832. Pop., 1920, 69,272.

PORTLAND, a city of Oregon, in Multnomah co., of which it is the county seat. It is on the Northern Pacific, the Southern Pacific, the Great Northern, Chicago, Burlington and Quincy, Canadian Pacific, and the Chicago, Milwaukee and St. Paul railroads. and on the Wilmette River. The city is built on sloping ground and is surrounded by beautiful scenery. It has an excellent climate. Portland has a large trade, and the river here is navigable for large vessels. It does an extensive export business with Great Britain, Japan, China, Hawaii, and the South American republics. It is also an important industrial city, and has over 800 manufacturing establishments, with an output valued at over fifty million dollars. The chief manufactures are pig iron, woolen goods, flour, furniture, carriages, clothing, boots and shoes, engines, boilers, etc. The city has an area of 66.3 sq. miles. There are about 1,400 miles of streets, excellently laid out. In the public schools are enrolled over 40,000 pupils. Among the public institutions are the Medical and Law Schools of the State University, Portland Uni-

versity, Portland Academy, and several hospitals. Portland was settled in 1846, and became a city in 1851. In 1891, it annexed the cities of East Portland and Albina. In recent years it has had a rapid growth. Pop., 1920., 258,288.

PORTLAND a city of Indiana, in Jay co., for which it is the county seat. It has lumber and flour mills. Pop. 1920, 5,958.

PORTLAND CEMENT. See CEMENT.

PORTLAND, ISLE OF (50° 32′ N., 2° 27′ W.), peninsula, Dorsetshire, England, in Eng. Channel; castle built by Henry VIII.; quarries of building stone, and a great breakwater; convict prison. Pop. 18,000.

PORTLAND, WILLIAM BENTINCK, FIFTH EARL OF (*c.* 1645-1709), Brit. statesman; one of Dutchmen promoted by William III.; lieut. gen. at Battle of Boyne, 1690; fought at Landen and Namur; ambassador to France, 1698, 1700.

PORTLANDIAN, or **PORTLAND BEDS,** subdivision of Jurassic system; the strata between Kimeridge Clay and Burbeck Beds; oolitic limestones, freestone, clays, and sands; fossils—fish, molluscs, and reptiles; well seen in Island of Portland, hence name.

PORT LOUIS (20° 10′ S., 57° 28′ E.), port, capital of Mauritius; see of R.C. and Anglican bp's; observatory; sugar. Pop., 1921, 39,300.

PORT MAHON, the cap. and principal seaport of Minorca, on the E. coast of the island. The chief exports are grain, livestock, and fruit; shoes and cotton and woolen goods are manufactured. Pop. 18,000.

PORTO CABELLO a city of Venezuela on the Caribbean Sea. It has a good harbor. Pop., with districts surrounding, 15,000.

PORT NATAL. See DURBAN.

PORTO ALEGRE (30° 1′ S., 50° 4′ W.), city, port, capital of state, Rio Grande do Sul. Brazil; bp's see; important commerce; exports hides, hair, wool. Pop. 151,000.

PORTOCARRERO, LOUIS MANUEL FERNANDEZ DE (1635-1709), Span. cardinal, 1669; abp. of Toledo, 1677.

PORTO FARINA, GHAR - EL - MELA (37° N., 10° 20′ E.), decayed town, Tunis, at mouth of Mejerda; ancient *Bogradas.*

PORTO MAURIZIO (43° 53′ N., 8° 1′ E.), seaport (and province), Italy, on Mediterranean; olive oil. Pop. 8,100. Province, which adjoins France, has area of 445 sq. miles. Pop. 150,000.

PORTO NOVO (11° 30′ N., 79° 48′ 48′ E.), seaport, Coromandel coast, Madras, India; Hyder Ali defeated here by British, July, 1781. Pop. 14,500.

PORTO RICO.—Fourth in size of the larger islands of the West Indies; situated between 18° 30′ and 17° 55′ N. latitude, and in longitude 68° and 65° 10′ W., from Greenwich. It is 100 miles long and about 36 miles wide, and consists of a series of hills and valleys, with the exception of a small strip of level coast line. All the valleys have rivers which become brooks in the dry season and raging torrents in the wet season. As far more rain falls on the N. side of the island than in the S., where much sugar is raised, an extensive irrigation system has been introduced to assure good crops in the dry region. The soil of Porto Rico is generally very productive. The coast affords numerous harbors, San Juan, Guanico, and Jobos are landlocked, and are suitable for small vessels, while Arecibo, Aguadilla, Mayaguez, and Ponce are open roadsteads. Near the coast of Porto Rico are a number of small islands. Culebra to the E. is rocky and barren with a magnificent harbor. Vieques, to the S.E., is 25 miles long and seven miles wide, and quite fertile. See MAP PORTO RICO.

Sugar is produced in the S. portion, while in the N. cattle raising is the chief industry. The climate of Porto Rico is delightful. It is never cold, and there are few hot days. The rainfall during the wet season is 48 to 49 inches, and in the dry season, 10 to 11 inches. The island is subject to hurricanes. Over 2,000 people lost their lives in the one that occurred August 8, 1899.

Historic Outline.—Porto Rico was discovered by Columbus on his second voyage, November 16, 1493. Under different Spanish rulers of the island the native Indians were reduced to slavery, so destructive, that when the King of Spain, in 1544, ordered them set free, the race had perished. In 1595, the English, under Drake, attacked the island, but were driven off by a Spanish fleet. Two years later Lord Cumberland took possession of the capital, but yellow fever wrought such havoc among his men that they were forced to leave the island. Other unsuccessful attacks were made, in 1702, 1703 and 1743, and 1797. In 1815, a royal proclamation inviting foreigners to the island, led to a great increase in the population. In 1825, Simon Bolivar and a body of Colombians landed on the

ATLANTIC OCEAN
CARIBBEAN SEA
PORTO RICO
Scale of Miles
0 5 10 15 20
Railroads
Railroads Projected
Improved Roads
Capital
The World Syndicate Company, Inc., N.Y.
ISLANDS WEST OF PORTO RICO
Same Scale as Main Map
ISLANDS EAST OF PORTO RICO
Same Scale as Main Map
MONA I.
MONITO I.
DESECHEO I.
CULEBRA I.
VIEQUES I.
PALOMINOS I.
CHICACOS I.
PINEROS I.
Long. West from Greenw.

island to help the Porto Ricans throw off the yoke of Spain, but they did not respond, and the army of liberation was forced to withdraw. The last fifteen years of Spanish rule were marked by many acts of persecution. Finally, on November 25, 1897, Porto Rico, was granted autonomy. The island was declared in a state of war, on April 21, 1898, and after the Spanish-American War, Spain, by treaty, ceded Porto Rico to the United States, December 10, 1898.

Population.—The population of Porto Rico, according to the census of 1920 is 1,299,809 and is divided as follows: white, 948,709; black, 49,246; mulatto, 301,816. Population of principal cities: San Juan, 70,707; Ponce, 41,561. Sixty-three per cent of the people are engaged in agriculture, fishing, and mining; 21 per cent in domestic, or personal service; eight in manufactures, and eight in trade and transportation.

Government.—The military government established by the United States after Spain ceded the island was superseded by the Foraker Act of 1900, which provided a civil government, the authorities appointed from Washington. In 1917, Congress passed the 'Organic Act,' which granted Porto Ricans American citizenship, the separation of legislative and executive functions, extension of appointive judicial system, and elective legislature. There are no property qualifications necessary to vote; any citizen of the United States may qualify after one years' residence. The governor is appointed by the President of the United States.

The Legislature.—Senate, 19 members; House of Representatives, 39 members. The island is represented in Congress by a Resident Commissioner to the United States, elected by the people, for four years. The six heads of departments constitute the governor's executive council.

Judiciary.—The attorney general and staff, and Supreme Court judges, are appointed by the President of the United States. There are eight District Courts appointed by the governor, who also appoints judges and officials of 36 municipal courts, and 55 justices of the peace. Governor Horace M. Towner, salary $10,000. There are three political parties. The Unionists, who demand independence and self-government, the Republicans, who advocate statehood, and the Socialists.

Education.—Public schools, 2,923; attendance, 160,794; teachers, 2,984; annual cost, $2,467,703. The University of Porto Rico, at Rio Pedras, offers higher education to men and women. School attendance has been compulsory since 1899. Illiteracy, 1920, 55 per cent.

Farm Products and Commerce.—There are 41,078 landholders. Total area, 2,022,404 acrea. Total value of all farm property, $151,283,818. Crops, in 1921, 490,000 tons. Coffee value, $26,731,648; oranges, $447,426; pineapples, $574,640; grape fruit, $2,019,557; cocoanuts, $690,895. Industrial establishments, 619, employing 18,454. Total capital, $4,154,310. Output value, $85,506,834. Gold, silver, platinum, copper and iron are found, but no mining establishments. Imports to Porto Rico., 1921, 105,479,703 tons. Value of shipments from United States, $60,977,112. From P.R. to U.S., $71,969,647. Principal products, sugar (raw), 47,636,987; tobacco, over 14,000,000 lbs.; cigars and cigarettes, 5,483,481 lbs; cotton manufactures, 3,660,124.

Finance.—The island revenues are derived from customs and excise, a general property tax, and collateral interest tax on incomes and insurance companies, licenses, and fees. Receipts, 1920-1921 (with balance), $11,849,638; disbursements, $11,551,654. The island's bonded indebtedness is $12,146,000.

Railroads and Transportation.—There are 1,180 miles of roads, and 339 miles of railroads that nearly circle the island, and also penetrate the interior. Telegraph offices, 1,574. Banks were unknown before 1888, there are now 15, with a combined capital of $2,250,000. Deposits, $12,000,000. Porto Rico is largely Roman Catholic, but the leading Protestant denominations are represented and there are Protestant missions.

PORT PHILLIP (38° 10′ S., 144° 50′ E.), bay, Victoria, Australia. Melbourne is at N. end.

PORT PIRIE (33° 10′ S., 138° 1′ E.); town, S. Australia, on Spencer Gulf; exports wheat. Pop. 8,000.

PORTRAITURE.—Colored portraiture, except in its ruder forms on Egyptian mummy cases or on Rom. mosaics, was not much in vogue in ancient times. Sculptured busts, both Greek and Roman, are numerous and unrivalled. Mediaeval art, dominated by the Christian conception, did not encourage P., though Ghirlandajo and some others introduced portraits incidentally into frescoes. The early Renaissance, in Germany and the Low Countries especially, revived P. Courts and wealthy Flemish cities with purse-proud aldermen supplied a ready market for Moro, Rubens, Van Dyck, and Rembrandt. In Spain, Morales, Zubaran, Velasquez, and Ribera; in France, Cousin, Rigaud, and, much later, Boucher, David, Greuze, and Gérard devoted their genius greatly to P. Reynolds and Gainsborough were the first great Eng. portrait painters.

PORT ROYAL a city of Jamaica. It has a good harbor, a naval arsenal hospital, etc. Pop. 15,000.

PORT-ROYAL, PORT-ROYAL DES CHAMPS, famous Cistercian nunnery, near Versailles, founded 1204; removed to Paris, and became prominent in XVII. cent. as Jansenist and educational center; abolished, 1710.

PORTRUSH (55° 13′ N., 6° 40′ W.), seaport, water-place, County Antrim, Ireland.

PORT SAID (31° 15′ N., 32° 18′ E.), seaport, Egypt, at entrance of Suez Canal; coaling-station. Pop. (including Ismailia) 91,090.

PORTSMOUTH (50° 48′ N., 1° 5′ W.), town, Hampshire, England, 18 m. S.E. of Southampton, on Portsea I., between Longstone and Portsmouth Harbor; includes Portsmouth proper, Portsea, Southsea, and (on opposite shore) Gosport; greatest arsenal, chief naval station, and most strongly fortified place in the kingdom. Pop., 1921, 247,343.

PORTSMOUTH, a city of New Hampshire, in Rockingham co., of which it is the county seat. It is on the Boston and Maine Railroad, and on the Piscataqua River. The harbor is commodious and navigable for the largest vessels. The industries include the manufacture of cotton fabrics, hosiery, boots and shoes, carriages, copper and brass, leather, soap, gloves, etc. The public buildings include a custom house, children's home, women's asylum. In Portsmouth, the peace conference between the Russian and Japanese representatives which ended the Russo-Japanese War, was held, at the suggestion of President Roosevelt, in 1905. Pop., 1920, 13,569.

PORTSMOUTH, a city of Ohio, in Scioto co., of which it is the county seat. It is on the Baltimore and Ohio Southwestern, the Mobile and Western, and the Chesapeake and Ohio railroads, and at the junction of the Scioto and Ohio rivers. It is the center and chief trading point of an extensive mining and agricultural region. The industries include rolling mills, iron and steel works, shoe factories, lumber mills, planing mills, foundries, paper bag factories, etc. There is a government building, a public library, and an old ladies' home. Pop., 1920, 33,011.

PORTSMOUTH, a city of Virginia, in Norfolk co., of which it is the county seat. It is on the Seaboard Air Line, the Chesapeake and Ohio, the Atlantic Coast Line, and the New York, Philadelphia and Norfolk railroads, and on the Elizabeth River. It is opposite Norfolk, Va. The harbor is one of the best on the coast and is navigable by the largest vessels. There is steamboat communication with the chief coast cities in the United States. Portsmouth is the seat of a naval hospital and marine barracks, and at the S.E. edge of the city is the Norfolk Navy Yard. It has a large export trade in cotton, lumber, fruits, naval stores, etc. During the World War, Portsmouth, with Norfolk, was a naval station of great importance. Pop., 1920, 54,287.

PORTSMOUTH, DUCHESS OF LOUISE DE KÉROUALLE (1649-1734), Duchesse d'Aubigny, 1684; mistress of Charles II.; famed for gallantry and rapacity; *m.* of Duke of Richmond.

PORT STANLEY cap. of Falkland Island. Has considerable export trade in wool, hides, etc. Pop, 1,000.

PORT SUDAN (19° 35′ N., 37° 12′ E.), town, Anglo-Egyptian, on Red Sea. Pop. 4,600.

PORT-VENDRESo ancient *Portus Veneris* (42° 33′ N., 3° 7′ E.), seaport, Pyrenees Orientales, France, on Mediterranean; exports wine.

PORTUGAL (37°-42° N., 6° 15′-9° 30′ W.), republic, forming W. part of Iberian Peninsula, Europe; bounded on N. and E. by Spain, W. and S. by Atlantic Ocean. It consists of six provinces—Entre Minho-e-Douro, Beira, Tras-os-Montes, Alemtejo, Estremadura, Algarve; Azores and Maderia Islands are accounted integral parts of Portugal; length from N. to S., *c.* 360 m.; average breadth, 100 m.; coast-line is *c.* 460 m., with two large indentations—Bay of Setubal and estuary of Tagus. Surface is generally mountainous, especially N. of Douro, where Cantabrian Mts. terminate; between Douro and Tagus is the Serra da Estrella (6,532 ft.), which reaches ocean at Cabo da Roca, the most westerly point of the country; the Serra de Monchique (2,963 ft.) runs into Atlantic at Cape St. Vincent. Immense plains stretch S. of Tagus; coastal districts generally flat (except near Lisbon and in S.) and marshy. Almost all geological formations are found; about two-thirds belong to Archaean (granite, schist, gneiss, etc.) and Palaeozoic periods: Cambrian and Silurian in region of Tagus and Douro; Carboniferous deposits in Alemtejo, etc.; extensive Jurassic rocks are found in Estremadura, Tertiary deposits in flat coastal regions and Tagus dist. Principal rivers are Minho, Douro, Tagus, and Guadiana.

Flora is rich and varied; extensive forests of cork, oak, pine, Port. cypress, etc., mainly in S.; large tracts of pasture-land; extensive moors of cistus; numerous fields of rhododendrons in Serra de Monchique. The fauna is akin to that of Spain.

Principal products are wheat, corn, rye, potatoes, tomatoes, oranges, lemons, figs, olives, grapes, and other fruits, and timber. Wine-making is an important industry; famous port-wine dist. is Alto Douro; important cattle-rearing in the N.; sheep and goats in the mountainous regions, and swine in the S.; valuable fisheries (sardine, tunny, oyster, whiting, etc.); much mineral wealth—viz., copper, antimony, iron, lead, tin, wolfram, manganese, salt, etc.; also marble, gypsum, and petroleum; coal is scarce, which accounts for many valuable mines not being worked. Other chief industries are cotton spinning, weaving of woolens, cork-cutting, tanning, glass and earthenware, lace, paper, gold and silver filigree work, porcelain tiles, making of preserves, hats, etc.; 43 per cent of country is waste land. Chief exports are wine, cork, cottons, fish, fruits, copper, timber, olive oil. Railway mileage, 1918, 2,047, of which 733 m. are state-owned.

There is no state religion, but Roman Catholicism is almost universal; there are 4,500 Protestants and *c.* 500 Jews. Portugal is divided into three eccles. provs. (including Azores and Maderia), with sees at Lisbon, Braga, and Evora. Republican government has separated Church from State. Monasteries were suppressed in 1834. Elementary education is compulsory and rigorously enforced since 1911. There are universities at Lisbon, Coimbra (founded 1290), and Oporto, military and naval schools and conservatoire of music at Lisbon, polytechnics at Lisbon and Oporto, besides schools of commerce, agriculture, and various other institutions. See MAP SPAIN and PORTUGAL.

Government.—Since 1910, Portugal has been a republic, with president elected for four years, and Congress, consisting of senate (71 members, elected for six years), and national council (164 members, elected for three years). Country is divided into 21 districts, each administered by governor and local council (*Junta*). There are a court of first instance in each of 193 comarcas, courts of appeal at Lisbon and Oporto, and a supreme court at Lisbon.

Chief seaports are Lisbon (cap.), Oporto, Setubal, Funchal (Madeira), Ponta Delgada (Azores), Tavira, Faro; largest inland towns, Braga, Coimbra, Evora, Covilha, Elvas.

Defence.—Military service is compulsory (Laws of 1887, 1911). From seventeen to twenty, youths undergo drill and rifle practice; at twenty, they pass into active army; volunteers, supplemented (if necessary) by conscripts chosen by lot, serve one year. Peace strength is fixed at 30,000 men. The navy is manned from the seafaring pop. by obligatory service. Ships are few, comprising three protected cruisers, some old small craft, etc. The personnel is *c.* 6,000.

Colonies.—Dependencies and colonies are: Cape Verde Islands, Port. Guinea, Angola, Sao Thome and Principe (islands), and Mozambique, in Africa; Goa, Damao, Diu (India), Macao (China), and part of Timor in Eastern Archipelago. Total area, 936,264 sq. m. Pop. *c.* 9,000,000. Port. colonies are administered by gov.-generals and governors. Area, 34,254 sq. m.; including Azores and Madeira, 35,490 sq. miles. Pop. *c.* 6,000,000.

History.—Like Spain, Portugal was in early times inhabited by Iberians and Celtiberians. Carthaginians made settlements on coast, III. cent. B.C.; country came under Roman rule, 138 B.C. (Lusitania); then successively taken by Alans, Suevi, Visigoths, and Moors, 711; partly recovered for Christendom by Ferdinand I. of Castile, and named *Portus Cale*, XI. cent. In 1095, Portugal became independent as hereditary fief of Count Henry of Burgundy; his *s.*, Alfonso I., assumed title of king, 1139, and conquered, with help of English Crusaders, Lisbon, 1147, which became the capital. The kingdom was gradually extended Southward until Algarve was taken, 1251. In 1383, the male line of house of Burgundy became extinct with Ferdinand I., and the crown passed to John I., his illegitimate *s.* From this time onward Portugal began to flourish. Port. mariners, aided and encouraged by Prince Henry the Navigator, laid the foundation of colonial empire and overseas trade; Ceuta, 1415; Madeira, 1420; slave trade begun, 1434. In reign of John II., 1481-95, Cape of Good Hope rounded by Diaz, 1486. During reign of Manoel I., 1495-1521, Vasco da Gama discovered sea route to India, 1498, and Brazil was taken, 1500; Ascension and Madagascar discovered, 1501; Goa, 1510; Malacca, 1511; Ceylon, etc., and island of Ormuz, 1515, in Persian Gulf. Portugal now controlled the E. trade, and was at the zenith of her power.

In 1850, the illegitimate Burgundian line became extinct. Conquered by Philip II. of Spain, 1581, who claimed the crown, Portugal suffered severely through Spain's wars with Netherlands, etc. (see SPAIN). Revolution broke out, 1640, and Duke of Braganza was proclaimed king as John IV.; the struggle for freedom continued until 1668, when

Spain was forced to recognize the independence of Portugal. During succeeding reigns her power declined, and a heavy price had to be paid for England's support against Spain and other foes. The famous Methuen Treaty was made with England, 1703, practically making Portugal commercially dependent on the former. Great government reforms were made by Pombal, the distinguished and powerful minister of Joseph I., 1750-77; Lisbon partially destroyed by earthquake, 1755. When Maria I., 1777-1816, ascended the throne Pombal was dismissed. In the Peninsular War, Portuguese were allied with Britain and Spain against Napoleon, 1807-14. The royal family had fled to Brazil, and when John IV. became king of Portugal and Brazil, 1816, he remained in Brazil and appointed Marshal Beresford governor of Portugal. This caused the revolution of 1820, and in 1821, a Liberal constitution was framed which John had to accept on his return, 1821. Bitter strife now ensued between Liberals and Reactionaries, led by John's *bro.*, Miguel. Brazil established its independence under John's *s.*, Pedro, 1825, who, as Pedro IV., resigned his claim to Port. crown in favor of his young *dau.*, Maria II., *la Gloria*, who ascended the throne, 1826, with her *great-uncle*, Miguel, as regent. In 1828, Miguel proclaimed himself king; a civil war followed until 1833, when Miguel renounced his claim.

In 1836 Maria II. married Ferdinand, Prince of Saxe-Coburg-Gotha (Ferdinand II., *d.* 1885). Pedro V. ruled, 1853-61, followed by Luiz I., 1861-89, during whose reign the various boundary disputes in Africa began. Britain claimed part of Delagoa Bay, which was eventually awarded to Portugal by arbitration, 1875; boundaries fixed in W. Africa by Germany, France, and Portugal, 1886; Macao ceded by China, 1887; Nyasaland dispute with Britain, 1889; in 1891, Port. Government withdrew its claim, which caused great dissatisfaction. When Carlos I. ascended the throne, 1889, the financial condition of the country was deplorable; national bankruptcy ensued, 1892. Carlos attempted to improve matters, and made Franco dictator; whereupon the king and crown prince were assassinated, Feb. 1., 1908. Manoel II. was proclaimed king; in 1910 a revolution broke out; the royal family fled to England; Lisbon was bombarded, and Portugal was proclaimed a republic. In 1911, a republican constitution was adopted, and was formally recognized by the Powers.

During the World War, under her treaty obligations, Portugal commandeered all Ger. and Austrian vessels in her waters. Germany and Austria declared war, in March, 1916, and Port. troops joined the Allies. Altogether, 65,166 officers and men were sent to France, where 1,862 were killed and 11,902 were taken prisoners or wounded; 35,000 Port. troops served in Africa, where the colonial natives were mobilized. During that period local revolutionary movements, centered in Lisbon, occurred; in 1918, Dr. Paez, who had carried out a *coup d'etat* the previous year, was elected president, but was assassinated, on Dec. 14. Admiral Canto y Castro, who succeeded, gave place to Dr. Antonio José de Almeida. A royalist uprising was suppressed in Feb., 1919.

Language.—Portuguese (also spoken in Brazil) is a Romance tongue, akin to Span. Galician; influenced by Celtic, Frankish, and Arabic invaders; abounds in sibilants and nasal sounds.

PORTUGUESE EAST AFRICA, dependency of Portugal, between Tanganyika terr. on N. and Brit. S. Africa on S., with Indian Ocean (1,400 m. of coast) on E. Lies between 10° 40'-27° S. and 31°-41° E. Area, 428,132 sq. m. Est. pop. 3,000,000 natives, 10,500 whites, and 1,100 Asiatics and half-castes. Divided into the prov. of Mozambique (295,000 sq. m.), Companhia de Mocambique (59,840 sq. m.), and Companhia de Nyasa (73,292 sq. m.). N. of Zambezi colony traversed by Changwari and Luasi hills (8,000 to 9,000 ft.), chief range being Namuli Mts. S. of Zambezi occupied by scatterd mountain groups (6,500 ft.), including Gorongoza plateau. Walled in on W. by Lebombo Mts. Gaza, in S., is broad steppe. Rivers S. of Zambezi include Pungwe, Sabi (Save), and Limpopo. Rainy season Nov. to March. Sugar, tobacco, tea, coffee, rice, millet, and beans round Inhambane. Highlands yield timber. Zambezi delta and valley of Busi have sugar plantations. Deposits of coal, iron, gold, etc., in Companhia do Nyasa. Chief exports: sugar, rubber, ores, wax, and ivory. Delagoa Bay Ry. (57 m.) from Lorenzo Marques runs N.W. to join Transvaal system. Railway from Beira to Bulawayo (240 m. in colony), and from Quilimane to Port Herald (153 m.); also line under construction from Delagoa Bay to Swaziland (44 m. open). Administered by various Port. chartered companies. Gov.-gen. resides at Lorenzo Marques, the capital. Vasco da Gama visited mouth of Zambezi, 1498; Mozambique captured from the Arabs, in 1507; Port. S. African possessions received separate government in 1509; boundaries fixed by Anglo-Port. agreements, 1890, 1891, and 1905. By Treaty of Versailles, Portugal allotted the 'Kebuga triangle,' S. of Rovuma R. (for-

merly part of Ger. East Africa). Ger. troops, during World War, were forced into Port. E. Africa during the last phase of the struggle. See MAP AFRICA.

PORTUGUESE GUINEA (*c.* 12° N., 15° W.), colony of Portugal, Senegambia, W. African coast; area, 13,940 sq. miles; boundary was fixed by agreement with France, 1886; includes Bissagoz Islands; capital, Bolama; principal port, Bissau; produces rubber, ivory, hides, wax, ground-nuts, oil-seeds, mahogany, rice. Pop. 400,000. See MAP AFRICA.

PORTUGUESE INDIA, comprises the three dependencies of Goa (*q.v.*), on the Malabar coast; Damao, on the coast 100 m. N. of Bomnay; and Diu (*q.v.*), a small island about 130 m. W.of Damao. See MAP S. and EAST ASIA. Pop. 650,000.

PORTUS (41° 45′ N., 12° 15′ E.), ancient harbor, Latium, Italy, at mouth of Tiber; constructed by Claudius; named by Nero, *Portus Augusti*.

POSEIDON, or **NEPTUNE** (classical myth.), god of the sea in Gk. mythology, and identified with the Roman god Neptune. He was the *s.* of Cronus, and when new order was established Zeus became lord of Heaven, Poseidon of the sea, and Hades of the under-world.

POSEN (52° 24′ N., 16° 51′ E.), town, cap. of prov. of Posen, Poland, on Warthe, 90 m. N. of Breslau; XVIII. cent. cathedral, and XV. cent. church, Kaiser Frederich Museum, and Royal Hygienic Institute. Castle intended to placate Poles, begun 1905, opened by ex-Kaiser William II., in 1910; agricultural implements, machinery, liqueurs, beer, and cigars. One of oldest towns in Poland; residence of early Polish monarchs; a flourishing member of Hanseatic League. Important border fortress. Passed to Poland by Treaty of Versailles. Pop., 1921, 156,691.

POSITIVISM, any system confining philosophy to data and methods of natural sciences, and opposed to *a priori* assumptions.

POSSESSION (Law), originally, the condition of mastery over a material thing, giving the power to deal with it at pleasure to the exclusion of other persons. Hence it was detention, or use. This power of use or detention became ownership under certain conditions, or the legal authority over an estate. So now possession may be either *actual*, where a person enters upon lands or tenements by inheritance; or *in law*, when lands, etc., have been bequeathed or inherited, but have not been actually entered upon.

For P. in sense of being controlled by spirits, see DEMONOLOGY, EXORCISM.

POSSNECK (50° 43′ N., 11° 38′ E.), town, Saxe-Meiningen, Germany, on Kotschau; flannel. Pop. 12,500.

POSTAGE STAMPS, the name given to printed labels, pasted on packages or letters to show that the cost of transportation has been paid. They are usually issued by governments, but may also be put out by carrying companies. The term is usually employed, however, to indicate stamps issued by governments and in this case they have a recognized value, according to the amount indicated on their face. Adhesive stamps originated in 1840, when Roland Hill, Postmaster General of England, conceived the uniform penny postage plan. Up to that time it had been the custom to charge for the transportation of packages in proportion to the distance covered. The use of this form of stamps rapidly spread to other countries, and is now universal. There are many varieties of postage stamps, but their characteristics are restricted within certain limits. They are usually square in shape, but may take other forms. It has been the custom in recent years to celebrate national events by the issue of special stamps. In the United States ordinary stamps usually bear the portrait of one of the Presidents. Collecting of stamps, called philataly, has an international vogue, especially among young people.

POSTAL SAVINGS BANKS.—Institutions under Government control, and operating in conjunction with the post offices, for the deposit of small sums at a low rate of interest, designed to serve the convenience of the public and encourage habits of thrift. The system was established in Great Britain, in 1861, and proved eminently successful. Almost every European nation followed the lead of Great Britain. Although the subject had been agitated in the United States since 1871, the system was not put into operation until 1910. Under the Postal Savings Act, amounts as small as $1.00 may be deposited in any Post Office authorized to accept deposits. The depositor must be at least 10 years old. No one can have more than one account at the same time, either in the same office or at different offices. Post office employees are not permitted to reveal to anyone the amount to the credit of any depositor, and the accounts of married women are free from interference by their husbands. The total amount that anyone may deposit is limited to $2,500, exclusive of accumu

lated interest. If the place in which one resides has no Postal Savings department, an account may be opened by mail through the local postmaster with the nearest depository office. Deposits are acknowledged by certificates made out in the name of the depositor, and these are not negotiable or transferable. At any time the amount deposited can be withdrawn, either in part or whole, upon demand. The certificates bear interest at the rate of two per cent a year. If the depositor choose, he may exchange the whole or part of his deposits for U.S. Postal Savings Bonds, bearing two and a half per cent interest, and issued in denominations of $50, $110, and $500. These bonds are exempt from tax and are payable 20 years from date, though the Government may, if it pleases, redeem them after one year from date of issue. The interest and profit accruing from the system must be applied in the first place, to the payment of interest to the depositors, and any excess must be covered into the Treasury of the United States. The deposits received by the Government are required by law to be redeposited in solvent local banks at interest of two and a half per cent. In 1923, the total number of Postal Savings Bank depositors in the United States was reported as 466,109, and the deposits aggregated $152,389,903.

POSTAL SERVICE.—The despatch and conveyance of letters and parcels by governmental agency. This has been done from time immemorial, although in ancient times such service was only established and maintained by governments or important individuals for their own use. The word 'postal' has its origin in the Latin *positus*, meaning 'placed,' and refers to horses or runners posted or placed at intervals so that fresh messengers might take up the work of wearied ones. Frequent references to posts are found in the Old Testament, and there was a well organized system of couriers in Persia, Rome, and among the Aztecs and Chinese. As an organization for the benefit of the public in general, however, the system only dates back a few centuries. In France, a postal system was organized by the University of Paris, about the end of the XIII. cent.; in Germany, in the latter half of the XV. cent., and in Italy, in 1561. A public post was established between London, England, and Edinburgh, Scotland, in 1635, and in 1683, a penny post was set up in London. The first British postal stamp was brought into use in 1840, and following that date progress was rapid, the parcel post, banking, and telegraph facilities being added to the system.

Colonial postal systems in a crude form were inaugurated in Massachusetts, in 1639; in Virginia, in 1657; in New York, in 1672; in Connecticut, in 1674, and in Pennsylvania, in 1683. A service for all the colonies was initiated in 1691, when the American Post was established. Andrew Hamilton was appointed Postmater General of America in the following year. There was a weekly service in summer, and a fortnightly service in winter. From 1707 to 1775, the service in America was controlled by the General Post Office in London. Benjamin Franklin was placed in charge of the postal service and greatly promoted its efficiency; but because of a controversy with Governor Hutchinson of Massachusetts, he was removed, in 1774. The Continental Congress, in 1775, resolved to have a Post Office system of its own, and Franklin was chosen as administrator. Later he was succeeded by his *son-in-law*, Richard Bache. In 1794, the American Congress placed the Postal Service on a systematic basis, and in 1799, it was thoroughly revised. In Madison's administration the office of Second Assistant Postmaster General was created. At that time the cost of delivering a letter was from eight to twenty-five cents, according to districts. A change in the scale was made in 1845, when six cents was charged for a letter not going over 30 miles; ten cents for not over 80 miles; eighteen and three-quarters cents for not over 400 miles; and twenty-five cents for greater distances. At this time the postage was collected entirely in money, and might be prepaid or postpaid. In 1847, stamps were introduced; stamped envelopes were first used in 1853; and the registration system was adopted in 1854. The free delivery service was established under the administration of President Lincoln, in 1863. Ten years later the postal card was introduced. The money order system was established in 1864, and the rural free delivery service in 1897. Postal Savings banks came into existence in 1910, and the parcels post was instituted in 1913.

POSTERS, BILLS, or **PLACARDS,** printed or illustrated, and displayed to convey a message to the public. The custom was in vogue among both Greeks and Romans, but the invention of printing gave it a widespread development. The colored poster in its present form was originated by Cheret, a French lithographer, who issued the first example in 1866. During the World War posters were used to arouse enthusiasm in the various countries, and the most eminent artists contributed their services in their designs. Some of these attained a high

order of artistic merit.

POST - IMPRESSIONISM, name given to the art development following Impressionism, and representing not a continuation of, but a reaction from the former movement. It combats the attitude that art is a matter of imitation, and holds rather that its chief concern is creation; that its aim, as has been said, is 'not at illusion, but at reality.' A work of art, according to this creed, is not an attempt to transfer to the canvas some phase of nature, but to give expression to the artist's emotional experience of life, to which all other facts are made subsidiary. Briefly, it subordinates representation to expression. Aside from this fundamental principle the work of the post-impressionists is in general characterized by a bold decorative sense, frank use of color, and the use of certain simple formulas for mass.

Of the various manifestations of post-impressionism, the two which have attractedthe greatest attention are *Cubism* and *Futurism.* Cubism is characterized primarily by the attempt to produce mass effects through the repeated use of a single geometric unit, preferably the cube, as well as by free use of decorative color. Futurism is even more revolutionary, standing as it does for the translation of motion into the terms of plastic art.

POSTMASTER GENERAL. — The chief executive of the United States Postal Service, Washington, D.C. There are four assistant postmaster generals, and superintendents of Foreign Mails, of Railroad Mail Service, of Dead Letters, of Postmaster Appointments, and a Chief Inspector. Post Offices in the United States, 1921, 52,168. In that year the Air Mail Service carried 1,224,923 pounds of mail at a cost of $1,215,167. In 1923, a great air service station was constructed at Maywood Field, Chicago. Postal revenues for the fiscal year ending June 30, 1921, $463,-491, 274.70. Expenses, $620,993,673.65. Receipts for year 1922, ending January 1, 1923, $484,853,000. Expenses, $545,-644,000. Rural routes, 44,186. Miles of railroad postal service, 219,709. Postmaster General, Harry S. New, appointed March 4, 1923.

POST, MEVILLE DAVISSON (1871), author; *b.* at Harrison co., West Virginia. In 1891, graduated from West Virginia University; admitted to the bar of Supreme Court of West Virginia, United States Circuit Court of Appeals, Supreme Court of the United States. Author of *The Strange Schemes of Randolph Mason, 1896*; *The Man of Last Resort, 1897*; *Dwellers in the Hills, 1901*; *The Corrector of Destinies, 1909*; *The Gilded Chair, 1910*; *The Nameless Thing, 1912*; *Uncle Abner, 1918*; *The Mystery of the Blue Villa, 1919*; *The Sleuth of St. James' Square, 1920.* In 1914-1915, member of advisory committee on question of efficiency in administration of justice of National Economic League.

POST OFFICE. See Postal Service; Postmaster General.

POST-TERTIARY. See Geology.

POTASH. See Potassium.

POTASSIUM, K. (kalium), 39·10; metallic element of alkali group; occurs combined in many silicates; by the weathering of felspar, etc. The Stassfurt deposits include sylvine KCl; carnallite, $KClMgCl_26H_2O$; kainite, $K_2SO_4Mg,SO_4MgCl_26H_2O$ (see Manures). Potassium compounds are an essential plant food, and wood ash contains potassium carbonate (potash = ash from pot). Metal was first obtained by Humphry Davy, 1808, by electrolysis of fused caustic potash (previously thought an element), and is still prepared by the same method. It is not manufactured to any great extent. Sodium, more easily produced, serves all the purposes for which potassium is required.

Properties.—Lustrous silvery white, crystalline, sp. gr. 0·862, brittle at 0° C., soft at 15° C., melts at 62·5° C., b.p. 720° C.; vapor green, colors Bunsen flame lilac, spectrum contains a red and a violet line; quickly tarnishes in moist air, rapidly decomposes cold water; mono-valent, and most electropositive of the well-known metals; hydroxide, KOH, a strong alkali. The salts are numerous and important; stable and soluble in water, the least soluble being $KClO_4$, $KHC_4H_4O_6$, K_2PtCl_6 (by which metal is estimated).

POTASSIUM COMPOUNDS. — Chemical compounds containing the metal potassium. Many of them are of great industrial importance. *Potassium antimony tartrate* is used in dyeing, as a mordant, and in medicine. It is known as tartar emetic, and as it is a powerful poison it should be carefully distinguished from *Potassium bitartrate*, or cream of tartar which is used in baking powders, and in medicine. *Potassium bromide* is an important drug, being used as a nerve sedative and as a cure for headaches. It is also used in photography. *Potassium carbonate* occurs in wood ashes, and is used as a fertilizer in the manufacture of soft soaps, in medicine, in dyeing, and in glass manufacture. *Potassium chlorate* is used in explosives, in matches, and in textile printing. *Potassium chloride* occurs

naturally in the famous Strassfurt deposits, and is of great value for fertilizing. *Potassium hydroxide* is used in soap manufacture, and as a re-agent in analytical chemistry. *Potassium iodide* is used in medicine, and in photography. *Potassium nitrate*, otherwise known as nitre or saltpetre, occurs naturally in certain soils in India and Ceylon, and can be obtained by permitting manure or other organic matter to decompose and then extracting with water. It is employed in the manufacture of gunpowder and fireworks, and also has value as a fertilizer. *Potassium permanganate* is a well-known disinfectant and deodorant, and is also used for bleaching textiles, and for many other purposes. *Potassium sodium tartrate* forms the familiar Rochelle salt, used in medicine as a laxative. *Potassium aluminum sulphate*, or potash alum, is used in medicine, and to some extent in the textile and paper industries. The above compounds are only a few of the almost innumerable substances which can be prepared with potassium as one of the constituents, but they represent those most widely used.

POTATO, or **SOLANUM TUBEROSUM**, a plant (order *Solanaceae*), the underground tuberous stems of which constitue the most important vegetable crop in Britain. It was introduced from America into Britain in the XVI. cent. by Sir Walter Raleigh, but had been brought a little earlier to Italy and Spain. For nearly 200 years it was not recognized as a valuable food product, and it is only since the middle of the XIX. cent. that attempts have been made to improve the quality and cropping powers of the tubers. Great numbers of new varieties, obtained by sowing the seed from the berries obtained by cross-fertilization of the flowers, have been introduced from time to time. Varieties are classified as early, maincrop, and late. In ordinary practice, the crop is grown from tubers, the eyes of which are buds that can develop into new plants. P's do best in a warm and comparatively dry climate, with a deep sandy loam, and porous subsoil. From 12 to 18 cwt. of sets are required per acre. The early varieties are planted in February and March; drawing the earth up to the rows is an important protection against frosts.

POTATO-BEETLE. See COLORADO BEETLE.

POTCHEFSTROOM (26° 30′ S., 27° 40′ E.), town, Transvaal; former capital of South African Republic. Pop, 12,500; 8,230 white.

POTEMKIN, GREGORY ALEKSANDROVITCH, PRINCE (1736-91), Russ. statesman and general; favorite of Catherine II. (*q.v.*); retained power throughout life, skilfully managing her for his own ends; *d.* during successful invasion of Turkey.

POTENTILLA, genus of plants, order *Rosaceae*; common wayside plants are Creeping Cinquefoil (*P. reptans*), Goosegrass or Silverweed (*P. anserina*); flowers white or yellow.

POTENTIOMETER, instrument used for measuring the electromotive force between two points; a form of electrometer.

POTENZA (40° 39′ N., 15° 48′ E.), town, capital of P. province, Italy; ancient *Potentia*. Pop. 18,000; prov. 490,000.

POTI (42° 6′ N., 41° 41′ E.), seaport, Kutais, Russ. Transcaucasia, on Black Sea. Pop. 20,800.

POTOMAC, ARMY OF THE.—One of the principal Federal armies in the Civil War, operating chiefly in Virginia. It was organized in 1861, by General George B. McClellan, and was engaged in the Peninsula campaign, and subsequently at Antietam. General A. E. Burnside took command, in November, 1862, and the army was defeated, in December, at Fredericksburg. General Joseph Hooker succeeded to the command, in January, 1863, and in May was badly beaten at Chancellorsville. In July, General George C. Meade was appointed commander, and the army won the Battle of Gettysburg. Meade continued in command, under Grant, until 1865.

POTOMAC RIVER.—A stream forming the boundary between Maryland on the N., and E., and West Virginia and Virginia on the S. and W., emptying into Chesapeake Bay. It rises in two main branches in the N. part of West Virginia, flowing N.E. and then S.E. The main branch is 360 miles long. At Washington it is navigable for large ships. Below the city it widens into an estuary several miles wide. The Great Falls, 35 ft. high, are 11 miles above Washington. The largest tributary is the Shenandoah. Others are the Monocacy, and the Bull Run.

POTOMAC, SOCIETY OF THE ARMY OF THE.—Founded in New York City, July 5, 1869. An American military organization that developed from the Civil War. All officers and soldiers of the Army of the Potomac, and of the 10th and 18th armies of the James, are eligible to membership.

POTOSI.—(1) (20° S., 65° 30′ W.), S.W. department of Bolivia, bordering Chile and Argentine Republic; mountainous; rich in metals. Pop. 531,000. (2) (19° 38′ S., 65° 25′ W.), city, capital of above; silver mines. Pop. 29,800.

POTOTAN (10° 50′ N., 122° 40′ E.), town, Panay, Philippine Islands. Pop. *c.* 30,000.

POTSDAM (52° 24′ N., 13° 3′ E.), town, on Havel, Prussia; capital of Brandenburg province; 17 miles from Berlin; Prussian royal residence; fine Brandenburg gate, Palace *Sans-Souci*, New Palace, etc.; optical instruments, sugar refineries, breweries, etc. Pop., 1920, 58,391.

POTT, PERCIVAL (1714-88), leading Eng. surgeon of his time; surgeon to St. Bartholomew's Hospital, 1749; introduced many important new surgical methods. A particular type of fracture of the ankle, and a tuberculous disease of the spine are name after him.

POTTAWATAMIES.—A North American Indian tribe of Algonquin stock, who roved about the S. shores of Lake Michigan. All but a few are on reservations in Oklahoma, Kansas, and Michigan. In 1922, they numbered 3,085.

POTTER, ALONZO (1800-65), Prot. Episcopal bp. of Pennsylvania, 1845; able as administrator and educationist. His *bro.*, Horatio Potter, 1802-87, was Prot. Episcopal bp. of New York. Alonzo's *s.*, Henry Codman Potter, 1835-1908, Prot. Episcopalian bp. of New York, 1887 (as assistant bp., 1883); prominent in social work.

POTTER, DAVID (1874), rear admiral; *b.* at Bridgeton, New Jersey. In 1896, graduated from Princeton College, and studued law under *f.* Served on different ships during Spanish-American War, and also during Philippine and Vera Cruz campaigns. Since 1921, chief of Bureau of Supplies and Accounts, and paymaster general of Navy. Ranked as rear-admiral since the same year. Author of *Remarks on Workings of a Navy Yard Pay Office, 1906*; *The Supply Corps of the Navy, 1918*; *Our Newest Navy, 1919.*

POTTER, HENRY CODMAN (1835-1908), Prot. Episcopal Bishop; *b.* in Schenectady, New York, May 25, 1835; *d.* July 21, 1908; *s.* of Bishop Alonzo Potter. Educated at Episcopal Academy, Philadelphia, Union College, and Theological Seminary of Virginia. Ordained priest, 1858, and after holding pastorates in Greensburg, Pa., and Troy, New York, and as assistant of Trinity, Boston, became rector of Grace Church, New York City, in 1863. Assistant Bishop of New York, 1883; bishop, 1887. He was active in promoting the building of the cathedral of St. John the Divine, on Morningside Heights, New York, and was known for wide charities, and his interest in civic affairs. The beer saloon, he declared, was the poor man's club, which should be improved and not abolished. With this view he helped to establish a tavern in the Bowery, New York, which was not a success, 1904. Publications: *The Christian Church and her Child*; *The Religion of Today, 1877*; *The Scholar and the State, 1897*; *The Law and Loyalty, 1903*; *The Drink Problem, 1905*; and others.

POTTER, PAUL (1625-54), greatest of Dutch animal painters. The life-size *Young Bull* is the most celebrated of his pictures. His *Dairy Farm* was sold in London, in 1890, for $6,090.

POTTER, PAUL (MEREDITH) (1853-1921), American journalist and playwright; *b.* in Brighton, England, June 3, 1853; *d.* in New York City, March 7, 1921. He entered newspaper work as dramaric critic of the *New York Herald*, editor of *Town Topics*, and, in 1888, joined the editorial staff of the *Chicago Tribune*. He wrote a great number of plays, most of them based on French sources, or adaptations of novels. Among his dramatic pieces are *The City Directory, 1889*; *Our Country Cousins, 1893*; *The Pacific Mail* (for William H. Crane), *The Victoria Cross, 1894*; *Trilby, 1895*; *Nancy Stair, 1905*; *The Honor of the Family, 1907*; *The Girl from Rector's, 1909.* In 1900, he was the American representative at the Congress of Dramatic Art in Paris.

POTTERY.—The art of fashioning rude clay urns, vases, and other earthen vessels, evidently dates back to little after the first appearance of man, for traces of these vessels have been found in the tombs of the earliest prehistoric races.

Pottery may be roughly divided under three heads: (1) *Earthenware*, a material exposed only to a moderate heat in the process of baking, which can be scratched with a pointed instrument; (2) *Stoneware*, a harder substance, baked at a great heat; and (3) *Porcelain*, including all the more delicate forms of pottery which is fired at the highest possible temperature. The commoner sorts of clays are so impregnated with metallic ores and other foreign substances as to be useless except for the manufacture of bricks, tiles, etc. The purest kind of workable clay is that known as Kaolin or china-clay, consisting of hydrated

silicate of alumina, and smaller proportions of lime, soda, and potash, and derived from decomposed granite rock. Another fine potter's medium is that known as *pipeclay*, or blue clay. The ingredients used in the mixing of porcelain clay vary in proportion in different countries and in different districts, but the following may be named as the chief constituent elements: kaolin, sand, pipeclay, chalk, ground flints, Cornish stone, and the calcined bones of oxen and sheep.

Modern Porcelains.—A brief account must now be given of the rise and develoepemnt of the porcelain industry.

Chinese.—It is to the Chinese that we owe invention of porcelain. It is certain that the craft flourished in China under the Ming dynasty, which lasted from 1368 to 1644 A.D. Indeed, there is evidence that porcelain was being manufactured in China under the Tang dynasty, 618-907, and that it was a flourishing industry during the rule of the Sung emperors, 960-1279. The earlier examples of the art are now almost entirely lost to us, but there are in existence numerous examples of the XVII. and XVIII. cent's at least, and at the present time excellent work is being manufactured, and the glorious traditions of the china we call Old Nanking are still preserved.

Japanese.—The Japanese certainly learned the craft of porcelain manufacture from the Chinese. The first Jap. porcelains are believed to have been made about 1510 A.D. Europeans have little opportunity of comparing the early work of the Japanese in this medium with that of other nations, as most of the finest examples are still in Japan. Such specimens as are known to us are chiefly XVIII. cent. work, and are called by the names of the districts in which they were made—Kaga, Kioto, Hizen, and Owari. They were known as Satsuma does not, strictly speaking, belong to the porcelain class.

European.—Porcelain is believed to have been manufactured in Italy as early as the XV. cent., but the earliest examples which exist were manufactured about 1580, for Francis de' Medici, Grand-duke of Tuscany; after his death, seven years later, the industry sppears to have languished. About a cent. later a small amount of porcelain was produced in Paris and Rouen, while, in 1693, manufacture was begun at St. Cloud, other French towns shortly afterwards also engaging in the industry. A factory was established at Vincennes about 1745, in which Louis XV. eventually became a partner. Then, in 1756, for want of space, the manufacture was transferred to Sévres, and in 1759, the king became sole proprietor. The products of this noted factory have always been the fragile porcelains of the aristocracy, no attempt being made to cater for the requirements of the middle classes, and kings made presents to one another of Sévres china, the nobility of Europe and the leaders of society competing with each other in collecting examples of the work produced by the royal factory. All the earlier porcelain made at Vincennes and Sévres was what is known technically as *soft porcelain*, and it was not until 1764 that the *hard* variety was first produced there. Saxony must be regarded as the real home of 'hard', or true Chinese, porcelain in Europe, and its invention was due to Johann Friedrich Böttger, who, in 1710, furnished Augustus II., King of Saxony, with the earliest example of what has since become known throughout the world as *Dresden china*. Every endeavor was made to keep the method of its manufacture a profound secret, but it was eventually betrayed, and factories for the making of Dresden ware came into existence in various places.

The value of pottery products in the United States is over $100,000,000 annually. The most important varieties are white ware, china, and stone ware. The industry has developed greatly, and many fine varieties of pottery are manufactured in different parts of the United States.

POTTOS, AFRICAN SLOW LEMURS (*Perodicticus*), genus of Lemuroidea (*q.v.*, under Primates) with short tail, short and nail-less index finger; nocturnal and sluggish; found in West Africa.

POTTSTOWN, a borough of Pennsylvania, in Montgomery co. It is on the Pennsylvania, and the Philadelphia and Reading railroads, and on the Schuylkill River and Schuylkill Canal. Its industries include rolling mills, furnaces, foundries, railroad repair shops, steel works, carriage factories, boiler works, etc. It has a public hospital. Pop., 1920, 17,431.

POTTSVILLE, a borough of Pennsylvania, in Schuylkill co., of which it is the county seat. It is on the Philadelphia and Reading, the Pennsylvania, and the Lehigh Valley railroads, and on the Schuylkill River. It is an extensive coal mining region, and its industries are chiefly identified with mining. There are, in addition, planing mills, a silk mill, and the shops of the Philadelphia and Reading Coal and Iron Company. It has a court house, a public library, and parks. Pop., 1920, 21,876.

POUCHED MOUSE, DORMOUSE PHALANGER (*Dromicia*), small marsupial, related to the Flying Phalangers; nocturnal and arboreal; found in W. Australia, Tasmania, and New Guinea.

POUGHKEEPSIE, a city of New York, in Dutchess co., of which it is the county seat. It is on the Central of New England, and the New York Central and Hudson River railroads, and on the Hudson River. It has steamboat connection with New York and Albany. The Hudson is here crossed by a cantilever bridge, which was completed in 1889, at a cost of nearly $5,000,000. It is an important industrial city, and has manufactures of iron, machinery, boots and shoes, leather, carpets, glass, shirts, clothing, drugs, etc. It is the seat of several private academies, the best known of which is Riverview Military Academy. Here also is Vassar College. It has parks, a public library, and an orphan asylum, and several charitable institutions. The city was settled by the Dutch, in 1698, and during the Revolution was the capital of the state. In 1788, the State Constitution to ratify the National Constitution met here. Pop., 1920, 35,000.

POULTICE, quantity of bread, linseed-meal, or other substance, mixed with hot water and spread on a cloth, applied to the skin in inflammation or sores, to reduce inflammation, soothe pain, or act as a counter-irritant.

POULTRY RAISING.—The rearing of hens, largely for eggs, the meat being a by-product. Although the artificial hatching of eggs was carried on in Egypt, in the earliest part of the historic period, it has been the invention of the modern incubator which has developed the production of poultry into a large industry. While the bulk of the eggs received in the markets of the large cities are still the product of the farm flock, averaging from a few dozen to a few hundred fowls in size, commercial poultry raising is carried on on a large scale, some flocks numbering up beyond 10,000. The supply of day-old chicks to the poultrymen has been more thoroughly commercialized than the actual production of the eggs. These plants, with incubator capacity sometimes amounting to a production of several millions of chicks in a season, may be found all over the country, but especially in the Middle West. The day-old chicks are shipped in cartons holding 100 each, the day after they are hatched, and travel from one to three days by express or parcels post, usually with a loss of less than three per cent, this being rendered feasible by the biological fact that a chick requires no food for 48 hours after being hatched. The poultryman then broods the chicks under artificially heated hovers for two months, developing them into laying flocks in from four to six months. The cockerels, averaging fifty per cent, are sold as broilers. The laying hens are usually sold at the end of the second year, as fowl. While the bulk of the egg shipments come from the Middle West, poultry raising has been most efficiently commercialized on the Pacific Coast, centering around Petaluma, Cal., and in New Jersey, centering around Vineland. Through organization in marketing the California poultrymen have become keen competitors of the Eastern poultrymen on the New York market, their eggs bringing as high a price as those of the local producers, in spite of the ten-days' period of shipment.

POUND.—(1) A unit or standard of weight. A P. avoirdupois contains 16 ozs., and a P. troy, 12 ozs., but the ozs. differ, for the P. avoirdupois weighs 7,000 troy grains of distilled water, as against 5,760 grains in the P. troy. (2) The principal coin of account in Great Britain and Ireland. It contains 240 pennies, and the name P. is derived from the fact that anciently 240 pennies were equivalent to a P. weight of silver. Formerly, the Scottish P. was the equivalent of the twelfth part of a modern P. sterling (*i.e.*, 1*s.* 8*d.*), and was divided into twenty shillings, each being equal to one English penny.

POUSSIN, NICOLAS (1594-1665) celebrated Fr. artist; *b.* in Normandy, settled in Paris, and *d.* in Rome. He was painter-in-ordinary to Louis XIII, and there is a fine collection of his pictures in the Louvre.

POUT, BIB, POUTING, or **WHITING POUT** (*Gadus luscus*), a relative of the Cod and Haddock, with brown body marked with upright bands; abundant in the Channel and on most parts of the Brit. coast.

POWDER, BLEACHING. See BLEACHING POWDER.

POWDER, See EXPLOSIVES.

POWDERLY, TERRENCE VINCENT (1849), an American public official, and labor leader; *b.* in Pennsylvania. He learned the machinist trade and for many years took part in trade unionism. He served as master workman of the Knights of Labor, from 1879 to 1893. He served three terms as mayor of Scranton, Pa., and, in 1897 was appointed commissioner general of immigration. He was admitted to the bar in 1894. In 1906, he studied in Europe, the causes of emigration, and in the following year was appointed chief

of the division of information, in the Bureau of Immigration. He wrote *Thirty Years of Labor*.

POWELL, JOHN (1882); Pianist, composer; *b.* in Richmond, Virginia. Graduated from Harvard, in 1901; studied piano and composition in Vienna. In 1909, made debut in Berlin and appeared in different countries of Europe. Composer of: *In the South, 1909*; *Variations and Double Fugue, 1911*; *At the Fair, 1912*; *Sonate Psychologique, 1913*; *Violin Concerto, E-Major, 1914*; *Sonata Virginianesque* (for piano and violin), *1919*; *In Old Virginia, 1921*.

POWELL, JOHN WESLEY (1834-1902), American geologist; *b.* in Mount Morris, New York, March 24, 1834; *d.* in Haven, Maine, September 23, 1902. He studied at Illinois, Wheaton, and Oberlin colleges, and enlisted as private in the Civil War, in 20th Illinois Volunteers. He lost an arm at Shiloh, in 1864; chief of artillery, 17th Army Corps; professor of geology, Illinois Wesleyan University, 1865-1868; explored Grand Canyon of Colorado, 1868-1869; exploring expedition in Colorado equipped by Government, 1870. Member of Public Lands Commission, 1879; director U.S. Geological Survey, 1881-1894; explored historic remains in Cuba, 1900. Author of *Sketch of American Province of Tusayan, 1875*; *The Lands and Arid Regions of the United States, 1879*; *Introductory Study of Indian Languages, 1880*; *The Canyon of Colorado*; and others.

POWELL, MAUD (MRS. H. G. TURNER) (1868-1920), American violinist; *b.* in Peru, Illinois, August 22, 1868; *d.* in 1920. She studied music in Chicago, Leipzig, Paris, and Berlin. Her first public appearance as a violinist was in Berlin, in 1885, when she achieved a popular and artistic success. Soon afterwards she returned to the United States, where she immediately won favor as a violin soloist. She performed solos with the orchestras of Thomas, Seidl, Nikisch, Damrosch, and others, and made long tours in the United States, England, Europe, and South Africa.

POWER, BALANCE OF. See BALANCE OF POWER.

POWER, ELECTRIC TRANSMISSION OF. See TRANSMISSION OF POWER, ELECTRIC DYNAMOS.

POWER, WATER.—The development of power from rivers and streams has become a matter of wide discussion and interest in recent years. The possible exhaustion of fuel supply in the future and the necessity of finding other sources of energy for industrial and other purposes has made this subject a very vital importance. The question has been considered by eminent engineers in the United States. In 1921, a group of engineers made a so-called super-power report from their studies of the zone between the Atlantic coast from Boston to Washington, and inland as far as Harrisburg and Utica. The report recommended the hydro-electric development of a super-power in this territory. The report declared that by 1930, with the proper development, about 21 per cent of the total energy required could be supplied by water from this area. It involved employing the use of water from the Potomac, Susquehanna, Delaware, Hudson, and Connecticut rivers. All important water-power developments in the United States are under the direction of the Federal Power Commission, established by the Water Power Act of 1920. Up to the beginning of 1922, there had been filed with the Commission 260 applications, involving over 16 million horse power. Great power developments include Niagara Falls, and the Coosa River, in Alabama. Other great power plants are in New York, Wisconsin, Oregon, and California. The great Mussel Shoals project in Alabama, which was projected during the war, is estimated would furnish sufficient power for industrial operations in several states. Its development depended upon the decision of Congress in regard to the method of its development. It is estimated that the total water power in the United States is about 112,000,000 horse power. Of this only about eight per cent has been developed. (See TRANSMISSION OF ELECTRIC POWER.

POWERS, HIRAM (1805-1873); American sculptor; *b.* in Woodstock, Vermont, July 29, 1805; *d.* in Florence, Italy, June 27, 1870. Educated at a district school, he worked at clock-making; modeled in clay; and for seven years was employed in the wax-works exhibition of the Western Museum, Cincinnati. He then went to Washington, and made busts of prominent men. Assisted by General John Preston, he visited Italy, and settled permanently in Florence, in 1837. His most noted statues are *Eve Tempted, 1838*; and *Greek Slave, 1843*. Other important works were *America, 1854*; *California, 1858*. He made a statue of Washington for the state of Louisiana, and of Daniel Webster, for Boston. Also busts of Jackson, J.Q. Adams, Edward Everett, John Marshall, and others.

POWERS, ALLIED AND ASSOCIATED. See ALLIED AND ASSOCIATED POWERS.

POWHATTAN (*d.* 1618), chief of the Indians in Virginia at the time of the settlement of that colony, in 1607. He was crafty and deeply versed in all the savage arts of government. After the marriage of his *dau.*, Pocahontas to Mr. Rolfe, he remained faithful to the English.

POWIS, WILLIAM HERBERT, MARQUESS OF (1629-96), Eng. courtier; imprisoned, 1679-84, on suspicion of complicity in Popish Plot; followed James II. to St. Germains; *w.* was governess of James II.'s children, 1688-91.

POWYS, JOHN COWPER (1872), an author and lecturer, *b.* at Shirley, Derbyshire, England, son of Charles Francis and Mary Cowper Powys. He was educated at Cambridge University. He began as a lecturer at Oxford University Summer Meeting in 1894 and the following year came to the United States and afterwards served as a staff lecturer at various universities and lecture societies, including Oxford University Extension, and the University Lecturer's Association, New York. Author: *The War and Culture*, 1914; *Visions and Revisions*, 1915; *Wood and Stone*, 1915, *Wolf-Bane*, 1916; *One Hundred Best Books*, 1916; *Rodmoor*, 1916; *Suspended Judgements*, 1916; *Mandragora*, 1917, and *The Complex Vision*, 1920.

POYNTER, SIR EDWARD JOHN, Bart. (1836-1919), Eng. painter; known for book-designs, water-color picture portraits, designs for Houses of Parliament, St. Paul's Cathedral, etc.

POZAREVAC, PASSAROWITZ (45° 15′ N., 21° 10′ E.), town (and department), Servia; treaty between Turkey and Austria sighed here (1718). Pop. 13,000.

POZOBLANCO (38° 22′ N., 4° 45′ W.), town, Cordova, Spain. Pop. 13,000.

POZZO DI BORGO, CARLO ANDREA, COUNT (1764-1842), Corsican politician, personal enemy of Napoleon; supported Paoli against Revolution; left Fr. for Russ. service and aided coalition against Napoleon; stirred Alexander to new war after Treaty of Tilsit, 1809; signed Treaty of Vienna, 1815, as Russ. ambassador.

POZZULI (ancient *Puteoli*), a seaport and the seat of a bishop, 7 m. W. of Naples, in Campania, Italy. It is built at the base and on the lower slopes of a hill which is cut off from the bay of Naples by the headland of Posilipo. During the 4th and 5th centuries the city was several times destroyed by volcanic eruptions; sulphur is still obtained from the half-extinct Solfatura, and the volcanic red earth known as 'pozzolana' is still worked up into cement and concrete.

PRACTICES, CORRUPT. See CORRUPT PRACTICES.

PRAED, WINTHROP MACKWORTH (1802-39), Eng. poet; *b.* in London; won early distinction for contributions to the *Etonian* and *Quarterly*.

PRÆMUNIRE, in English law, the offense of introducing a foreign power into England. Acts of Edward I., 1350, and Richard II., 1392, were expressly directed against provision of ecclesiastical benefices to aliens, and the procuring of authority from Rome against the king in the form of bulls and excommunications.

PRÆNESTE, PALESTRINA (41° 51′ N., 12° 54′ E.), ancient town on site of modern Palestrina, near Rome. Pop. 7200.

PRÆTOR, Rom. magistrate; name of consuls in Twelve Tables; supposed to have been revived when plebeians were admitted to consulship, the *proetur urbanus*, who was to be patrician, assuming legal functions of consuls; in any case soon open to plebs. *Proetor peregrinus* was established *c.* 242 to decide suits between citizens and aliens or outsiders; judicial powers lost under Empire; in some ways superseded by prefect.

PRÆTORIANS, members of Rom. *praetoria cohors*, bodyguard of emperor; term applied to force in praetor's army under Republic; organised by Augustus; became chief force in state; abolished by Constantine.

PRAGMATIC SANCTION, decree affecting Church or State. Famous P.)'s were: (1) by Charles VII. of France, asserting rights of Gallican Church, 1437; (2) by Charles VI. of Austria, settling crown on his dau., Maria Theresa, 1713.

PRAGMATISM, or **HUMANISM,** in philosophy, a school of thought emphasizing practical utlity as test for determining the truth of philosophical conceptions; a reaction against absolutism of recent metaphysics; theory put forward by C. S. Pearce (1878); developed by William James and F. C. S. Schiller. All thought is purposive and personal; no knowledge is determined exclusively by abstract intellectual considerations. The difference between two conceptions lies in the different consequences for life purposes involved in their belief. Pragmatism is connected with religion as justifying the will to

believe. Humanism is the application of the pragmatic method to all the sciences.

PRAGUE, cap. of Czecho-Slovakia (50° 5′ N., 14° 26′ E.), on riv. Moldau 217 m. by rail N. W. of Vienna. City consists of seven quarters; four on r. bk., three on l. bk.; Smichow (l. bk.), Karolinenthal, Zizkow, and Weinberge (r. bk.), are suburbs; Charle's Bridge (1357-1503), scene of martyrdom of John of Nepomuk (?1383); opposite town hall is Teyn church (1360-1460), important in religious strife of Bohemia, with tomb of Tycho Brahé (1546-1601). Clemnitinum contains seminary, univ. library, observatory, and part of univ. (founded 1348), divided in 1882 into Ger. section and Czech section. Rudolphinum contains conservatory of music and art institutions; Academy of Fine Arts. In the new town are the Czech Polytechnic, criminal law courts, etc.; on N. E. stands the Bohemian Museum. The l. bk. of river dominated by fortress of Hradschin. On same hill are Gothic cathedral (begun 1344), various palaces, monasteries, and gardens. At foot of hill are Parliament House and palaces, including that of Wallenstein. Engineering and iron works; chemicals, vehicles, cement, etc. For history, see BOHEMIA. Pop. with suburbs 1920, *c.* 1,000,000.

PRAHRAM, S. E. suburb of Melbourne, Australia. Pop. 43,000.

PRAIRIE (Lat. *pratum,* meadow), a vast tract of land, usually level in character, covered with grass, but devoid of trees. Such areas of land are common in the United States.

PRAIRIE CHICKEN, or **PEDIOECETES PHASIANELLUS,** a species of Phasianidae found in America, where it is also known as the sharp-tailed grouse.

PRAIRIE-DOG, a term applied to any of the four species of rodents in the squirrel family, Sciuridae and genus *Cynomys.* They are burrowing animals, averaging about a foot in length, and have the curious habit of dwelling in friendship with the ground owl and a rattlesnake. All are found exclusively in N. America.

PRAIRIE HEN, or **TYMPANUCHUS AMERICANUS,** a galliform bird of the family Phasianidae and sub-family Tetraoninae, to which belong the grouse and partridges; the term is also applied to *Tetrao Cupido,* a reddish-brown bird which is a near ally of *T. americanus.* Both species are natives of N. America.

PRATINCOLES (*Glareolidae*), a family of ten species of wading birds confined to the Old World.

PRAKRIT, a term applied to the vernacular languages of India as distinguished from the literary Sanskrit. The re are two famous epics in P. the *Ravanavaha* (which is similar in theme to the *Ramayana*) and the *Gaudavaha.* P. is also employed in Sanskrit dramas for delineation of subordinate characters.

PRATO (43° 53′ N., 11° 5′ E.), town, on Bisenzio. Florence province, Italy; Pop. 27,000.

PRATT, a city of Kansas. Pop. 1920, 5183.

PRATT, BELA LYON (1867-1917), sculptor, *b.* in Norwich, Connecticut, December 11, 1867; *d.* in Boston, May 19, 1917. Studied at the Yale School of Fine Arts, Art Students League, New York, and in Paris at the Beaux Arts. Awarded two prizes and medals in Paris. Instructor Boston Museum of Fine Arts from 1893. Gold medal Panama Exposition, 1915. Designed colossal groups for Water Gate, Chicago Exposition. Eliot Medal, Harvard, bi-centennial medal Yale. Designed 6 figures, main entrance of Congressional Library, figure of 'Philosophy,' and 'The Four Seasons.' Second medal, Buffalo Exposition. Statues of Bishop Brooks, Governor John Winthrop, Jr., and busts of General Paine and Bishop Huntington, Harvard War Memorial, and other sculptors.

PRATT, CHARLES (1830-1891). Merchant, philanthropist. *B.* at Watertown, Massachusetts. In 1851 removed to New York and began in business there. Was president in 1879 of the board of trustees of Adelphi Academy and in 1887 founded the Pratt Institute of Brooklyn.

PRATT INSTITUTE, a co-educational institution of technology situated in Brooklyn, N. Y., and founded in 1887 by Charles Pratt. Its curriculum includes instruction in fine and applied arts, science and technology, household science and arts, library science, education, and physical training. A large free public library is attached to the institution. It has a large endowment and the tuition fees are small. The student roll in 1923 numbered about 4,000, and the faculty over 150

PRATT, ORSON (1811-1881), Mormon Apostle; *b.* Hartford, N. Y.; *d.* Salt Lake City, Utah. He joined the Mormons in 1830 with his brother, Parley Parker Pratt, and, as one of the twelve Mormon apostles, became known as "the Paul of Mormonism" after considerable missionary work in the Eastern states and in Europe. He was also a successful

editor of Mormon propaganda publications. He was speaker of the Utah territorial legislature for several years. By self-tuition he became learned in mathematics and astronomy and wrote largely upon these subjects as well as upon Mormon doctrine. From 1874 he was the Church's historian and recorder.

PRAWN, small translucent Crustacea distinguished by the long spike (rostrum) projecting in front of the head; esteemed as food. See MALACOSTRACA..

PRAXITELES (fl. IV. cent. B. C.), Athenian sculptor; left reputation of perfect craftmanship. Nothing of his work was supposed to remain, but in 1877 his statue of *Hermes with Dionysos*, one of the masterpieces of sculpture, was discovered at Olympia; characteristics—beauty, grace, absence of severity of age of Pheidias. Several supposed copies of P.'s work are extant, *e.g.*, *The Satyr* of the Capitol, and *Aphrodite* (Vatican).

PRAYER, in general, is dealt with under Religion. Prayers for the Dead are associated with belief in a state of purgation after death. They appear in the Jewish liturgy and in Christianity from earliest times, through reference in New Testament is doubtful. At the Reformamation, together with belief in Purgatory, prayers for the lead were scouted by Protestants.

PRAYER, BOOK OF COMMON, name given to the liturgy of the Church of England in use since the Reformation. The movement for reformation in the public service of the Church originated during the latter years of the reign of Henry VIII. Cranmer's Litany appeared in 1544; a committee of Convocation sat for seven years and produced the Prayer Book of 1549, known as the first Prayer Book of Edward VI. The book was not considered satisfactory either by Protestants or Romanists. Another revision was undertaken, and the second Prayer Book was pub. in 1552, with numerous alterations in a Prot. direction. This Prayer Book was of short duration, and after the Catholic reaction of Mary's reign the Elizabethan Prayer Book appeared in 1559. It is practically the same book as that now used throughout the Church of England. The Commonwealth formally suppressed the Book of Common Prayer in 1645, and it was out of use until the restoration in 1660, when it was revised on lines as conciliatory as possible, without sacrifice of essentials, and was authorized in 1662. The Act of Uniformity of that year constituted it the only legal service book in England, and notwithstanding the secession of some two thousand ministers, the mass of the people welcomed the rule and adopted the Prayer Book.

PRAYING INSECTS, SOOTHSAYERS (*Mantidae*), a family of Insects with about 600 species, belonging to the order *Orthoptera*; furnished with long bristly fore-legs, the resting pose of which gives rise to the popular name, and which seize insects for food, for Praying Insects are extremely voracious. They occur in tropical and sub-tropical regions.

PRAYING WHEEL, used by Lamaist Buddhists, a machine with cylinder from which preyer on paper band is unrolled.

PREACHING, from very early times, has been a regular part of worship and form of instruction, though at some periods, particularly in the Middle Ages, it has fallen into disuse. Little is known of Christian p. until about 200 A. D. Then came Origen, and later, especially in the Eastern churches p. developed much. Among the most famous preachers were the Cappadocian fathers—Basil of Caesarea, Gregory of Nyssa, and Gregory of Nazianzus; then St. John Chrysostom and St. Augustine. In the Middle Ages came St. Bernard and the Franciscans and Dominicans. The Reformation brought about a great revival of p.

PREANGER (7° 15′ S., 107° 30′ E.); residency of Java, Dutch East Indies; mountainous, volcanic; chief products—tea, coffee, cinchona; capital, Bandong. Pop. *c.* 2,220,000.

PREBENDARY, the holder of a stall or endowment in a Cathedral or Collegiate Church, entailing upon him the duty of conducting services but no cure of souls.

PREBLE, EDWARD (1761-1807), Revolutionary naval hero and commander of the U. S. squadron that bombarded Tripoli; *b.* Portland, Maine. In 1779 he became a midshipman of the Massachusetts State marine, serving on the Protector, on which vessel he was captured by the British in a naval attack. After being confined in a prisonship in New York Harbor for a brief period, he joined the *Winthrop* and with fourteen men captured an armed Brit. brig under enemy fire. For many years after the war, with the abandonment of the Bay State navy, he followed commercial pursuits and travelled abroad extensively. He joined the United States navy upon its organization in 1798 as a lieutenant, became captain of the *Essex* the following year, and in 1803 was appointed to the command of the American

squadron operating against the Barbary pirates in the Mediterranean. He forced the Sultan of Morocco to make peace and blockaded Tripoli for several months following the capture of one of his vessels, the *Philadelphia* during a pursuit of Tripolitan gunboats. In 1804 he bombarded Tripoli in a series of attacks, captured three of its gunboats and sank three others. He received a gold medal for his services and the thanks of Congress, but his health had been undermined and he died soon after from consumption.

PRE-CAMBRIAN, the period of time before the formation of Cambrian strata. P. C. rocks are all of sedimentary origin, and consist of dolomites, conglomerates, sandstones, freestones, slates and limestones; many show signs of a glacial epoch. Fossils are rare.

PRECESSION OF THE EQUINOXES, a motion discovered by Hipparchus about 150 B. C., consisting of a slow advance of equinoxes, owing to revolution of earth' axis round pole of ecliptic, a similar effect to the 'wobbling' of a peg-top. Period of precession is about 26,000 years, or 50.35 seconds of arc per annum.

PRECIOUS METALS. See METALS, and under the titles of the various metals.

PRECIOUS STONES. See GEMS.

PREDESTINATION, theological term for God's foreknowledge of the future, or of His destination of mankind to eternal bliss or woe. Two great controversies, one between Augustine and Pelagius, the other between Calvin and Arminius, have been fought over p. Augustine and Calvin held that God had foredained some to salvation and others to damnation.

PREDICABLES, classification of the relations the predicate may bear to the subject of a proposition. See LOGIC.

PREDICATION, the nature of the relation between subject and predicate of a proposition.

PRE-EXISTENCE, DOCTRINE OF, existence of soul before union with body (cf. Pythagoras, Plato, etc.).

PREFECT, title of Roman official.—(1) *Proefectus urbis.* Official dating from time of kings; represented king or consuls in their absence. (2) Under republic new praefectures sprang up; *e.g. praefecti annonoe* supervised food supply; in subject Ital. towns *proefecti jure dicendo* represented *proefectus urbis.* (3) Under the Empire a new class of praetorian p's, commanders of imperial guard, sprang up; p's became permanent magistrates and system was extended to provinces. Fr. republic gave in 1800 name *proefectus* (*prefet*) to heads of provincial departments who took place of old *intendants*; app. by State they form connecting link bewteen central and local government.

PREGNANCY, the period of intrauterine development of the fertilised ovum. The time varies with different species of animals, and in human beings the average duration is from 274 to 280 days.

PRELATE (Latin, 'dignitary'), term now used only ecclesiastically. In the Anglican Church p's are abp's and bp's. In R. C. Church abbots and heads of orders and officials of Rom. Curia are also called p's.

PREMONSTRATENSIANS, NORBERTINES, religious order founded at Prémontré, France (1119), by St. Norbert; in England called 'White Canons'; branch of Canons Regular of St. Augustine; although primitive rule has been modified, it is still strongly ascetic.

PRENDERGAST, EDMOND FRANCIS. (1843-1918). An American Roman Catholic archbishop, *b.* in Clonmel, Ireland. He came to the United States in 1859. Studied at St. Charles Seminary, Overbrook, Pennsylvania, and was ordained a priest in 1865. Was an assistant at Susquehanna Depot, Pennsylvania, and St. Paul's, Philadelphia, At Allentown, Pennsylvania until 1874 and at St. Malachy's, Philadelphia, until 1897. From 1895-1897 vicar general of the archdiocese and was consecrated auxiliary bishop of Philadelphia in 1897. In 1911 he was appointed archbishop.

PRENTISS, SEARGENT S. (1808-1850), an American lawyer and orator, *b.* Portland, Me. He removed to Mississippi in 1827. He practiced law and was successful in his career. He was especially notable, however, as an orator. He was remarkable for his wit, sarcasm and power of argument.

PRENZLAU, PRENZLOW (53° 20′ N., 13° 50′ E.), town, on Ucker, Brandenburg, Prussia; ironworks. Pop. 21,000.

PRE-RAPHAELITES, see under PAINTING.

PRERAU (49° 25′ N., 17° 25′ E.), town, Moravia, Czecho-Slovakia; woolen cloth. Pop. 20,000.

PREROGATIVE COURT, court where a will of one dying in province of Can-

terbury and leaving goods in another diocese was proved by abp. of Canterbury; similarly with province of York; jurisdiction transferred to Probate Court 1857.

PRESBYTER, office in the Christian Church, properly the same as *priest* (*q.v.*), but the word really means 'elder,' and is generally used in a non-sacerdotal sense of the elders of Judaism and of Christian officials. The system of Church government called *Presbyterianism* (government by elders), has only existed in its present form since the Reformation. Much controversy has raged round the position of p's in the Early Church. According to one view—the most probable—p. and bp. were originally identical, though until about A. D. 60 there was little systematic organisation.

PRESBYTERIAN CHURCH, a sect founded upon Calvinism or the Reformed System of doctrine, and governed by presbyteries, or a method of church administration between prelacy and congregationalism. Presbyterianism was established in Zurich in 1523, when its doctrines were defined and became the tenets of Reformed churches established throughout Europe. The Church of Scotland adopted them under John Knox's leadership after separation from the papacy. The creed was introduced into England in 1572, and in the United Kingdom only developed into a number of branches, including the Church of Scotland, the Free Church of Scotland, the United Presbyterian Church of Scotland, the Presbyterian Church of England, Welsh Calvinistic Methodist Church (representing Presbyterianism in Wales, and the Irish Presbyterian Church.

In the United States the earliest Presbyterian churches were first established in Virginia (1614), New England, Maryland, the Carolinas and New York, and were chiefly of English origin. In later times its growth was stimulated by the coming of Scotch and Welsh colonists. The first presbytery was established in 1706, and in 1717 became transformed to a synod. By 1758, the church had 98 ministers, about 200 congregations and 10,000 members. After the Revolution there was a union between the Presbyterians and the Congregationalists of New England, which continued till 1858. From 1790 to 1837 the church membership increased from 18,000 to 220,557, due mainly to a religious revival and camp meetings in Western Pennsylvania, Ohio and Kentucky.

The leading American body of the present day, the Presbyterian Church, U. S. A., North, had a membership in 1922 of 1,722,254, 46 synods, 302 presbyteries, 56 colleges and universities, 12 theological seminaries, and three academies. It issues a number of widely-read periodicals. The next largest branch, Presbyterian Church, U. S. A., South, had 411,854 members, 17 synods and 88 presbyteries. Other branches of the church, which differ on points of doctrines or government from the parent body, are the Cumberland Presbyterian Church (12 synods, 70 presbyteries); United Presbyterian Church (70 presbyteries); Colored Cumberland Presbyterian Church (4 synods, 17 presbyteries); Welsh Presbyterian Church (Calvinistic Methodist), recently united with the Presbyterian Church, U. S. A.; Associate Reformed Presbyterian Synod (7 presbyteries); Reformed Presbyterian Church (Old School); Reformed Presbyterian Church, General Synod; and the Associate Synod of North America. These minor bodies numbered 268,284 in 1922.

The doctrines of the parent American body are the Westminster Confession of Faith and the Longer and Shorter Catechism, first adopted in 1729 and amended later to express the American doctrine of the independence of the church and of all religious opinion from the control of the State. The church's administration operates through four judicatures, namely, the session, which governs the Congregation; the presbytery, which governs the number of congregations within a limited geographic district; the synod, which governs the congregations within a greater geographic district; and the General Assembly, which is the supreme authority. The place and form of worship is left to the choice of ministers and congregations in accordance with their consciences. The sacraments ore administered by ministers only, and ordinarily only ministers and licentiates are authorized to teach officially. A book of common worship was approved by the General Assembly in 1906 for optional use by pastors and congregations.

PRESBYTERY (arch.), that part of a church to which priests alone have access, *i.e.*, around the altar.

PRESCOT (53° 26′ N., 2° 47′ W.); town, Lancashire, England; manufactures watches. Pop. 8000.

PRESCOTT, a city of Arizona, in Yavapai co. It is on the Southern Pacific Railroad and it's the center of an important mining region and is also an important trade center for the surrounding country. Pop. 1920, 5010.

PRESCOTT, WILLIAM HICKLING (1796-1859), American historian. *B.* in

Salem, Massachuestts, May 4, 1796; *d.* in Boston, January 28, 1859. He was a grandson of Colonel William Prescott, who commanded at Bunker Hill. During his college days at Harvard where he graduated in 1814, he lost the use of his left eye, and suffered from blind periods for the rest of his life. He tried law for a short time with his father. To improve his health he visited the Azores in 1815 and wintered in Italy 1816-1817. The profession of law being closed to him he decided on literature, preparing for it by intensive study. It was necessary that books should be read to him, while in writing he used a device for the blind. From 1821 to 1850 he wrote for the North American Review, the best of his work being published in volume form in 1845 as *Biographical and Critical Miscellany, Ferdinand and Isabella*, begun in 1826 was completed in 1836. It placed him in the front rank of historians of his time. He then began a *Life of Moliere*, but never finished it. His most popular work, *The Conquest of Mexico*, appeared in 1843, and *The Conquest of Peru*, a sequence in 1847. In 1850 he visited Europe, receiving the honorary degree of Doctor of Laws from Oxford. In 1854 he published two volumes of *The Reign of Philip II*, In 1858 while engaged on the third volume he had a stroke, and died of apoplexy before completing his work. His other books are: *Life of Charles Brockden Brown*, 1835. *Memoir of John Pickering*, 1848, and continuation of Robertson's *Charles V*, 1856.

PRESCRIPTION (Law), the rule that long usage makes good possession, founded on the legal assumption that an uninterrupted possession of anything for a sufficiently long period implies that no one disputes the right of the possessor to its enjoyment. Long possession supposes the acquiescence by all other claimants and a reason for that acquiescence. Negative p., implying undisturbed possession for a given time, gives a valid and unassailable title, for it deprives all claimants of the right to contest.

PRESCRIPTION, in medicine, a written direction for the preparation of one or more drugs, as a pill, powder, ointment, or mixture. According to ancient custom, a P. is usually written in Latin, and is preceded by the symbol R. The R. stands for recipe, and the cross is a remnant of an old superstition.

PRESENTATIONISM, term used in several distinct senses, more especially for (1) the view that in perception we have direct apprehension of other real things; and (2) the view that the mind is nothing but a flux of presentations.

PRESERVED FOODS. See FOOD, DESICCATED.

PRESERVATIVES. See ADULTERATION OF FOOD.

PRESIDENT.—(1) chief official of a body, *e.g.* Pres. of Board of Trade, pres. of a college. (2) head of a republic (*q.v.*). Pres. of U. S. A. has salary of 75,000 dollars, is commander-in-chief of army and navy, holds supreme executive power, chooses a Cabinet, retains office for four years. Fr. Pres. is elected for seven years by National Assembly, chooses his ministers, holds the right of pardon, appoints to military and civil posts; with Senate's consent he may dissolve Chamber of Deputies; salary is $120,000, with a similar sum for expenses.

PRESIDENT OF THE UNITED STATES, the highest executive office in the government of the Union, created by the Constitution, which went into effect in March, 1789. George Washington, the first occupant of the Presidency, was inaugurated in that year. The Constitution sets forth the President's qualifications, the methods by which he is chosen and specifies the powers he can exercise. He holds office for four years, and in case of removal, death, resignation and incapacity, is succeeded by the Vice-President. He must be a natural-born citizen of the United States (that is, no naturalized citizen is eligible), must have attained the age of 35 years, and have resided within the United States at least fourteen years.

He is commander-in-chief of the army and navy, and of the militia of the States; can grant reprieves and pardons for offenses against federal laws; has power, subject to the Senate's approval, to make treaties and nominate ambassadors, federal judges and other public officers whose appointments are not otherwise provided for by law, or may exercise sole power in appointing lesser officials where so vested by Congress. He informs Congress of the condition of the nation, may recommend its approval of measures whose adoption he considers desirable, and can convene Congress on his own initiative if he deems public business demands such a step. He can veto measures passed by Congress, but his veto can be overridden by a re-enactment of the measures by a two-thirds majority of both houses. While in office, he is the leader of the political party which elected him, and his power is strengthened when his party holds a governing majority in both houses of

Congress. On the other hand, his ability to influence the passage of legislation he desires is almost vitiated where the opposition party rules Congress by force of numbers.

During his tenure he is exempt from the jurisdiction of any court or magistrate, but is subject to impeachment by the Senate for treason or other high crimes, if the conduct of his office warrants such proceedings, and after leaving thr Presidency he may also be charged with wrongful acts committed while in office. He receives a salary of $75,000 a year.

PRESIDENTIAL SUCCESSION. See CABINET.

PRESS. See PRINTING; NEWSPAPE[S.

PRESSBURG, PRESBURG (48° 10′ N., 17° 6′ E.), town, on Danube; was capital of Hungary, 1541-1784, and seat of Hungarian Parliament until 1848; has cathedral, old ruined castle, and town hall; manufactures furniture, tobacco liquors. Pop. 78,000.

PRESSGANG the name given to the detachment of officers and men commissioned to execute warrants for the impressment of men to service in the British Navy. A rendezvous was chosen, and volunteers were enlisted, deserters arrested, whilst all able-bodied men were liable to be pressed. The employment of the P., though in abeyance is still legal.

PRESSURE, AIR. See COMPRESSED AIR.

PRESSURE, BLOOD. See BLOOD PRESSURE.

PRESTER, JOHN, semi-mythical Asiatic potentate of Middle Ages; mentioned in chronicle of Otto, bp. of Freisingen, who was told by a Syrian bp. (1145) that John, a few years previously, was both king and priest of a Christian country between Persia and Armenia. John was identified later with Ung Khan, king of Tartar tribe of E. Asia, converted to Christianity and slain in warfare with tributary potentate Genghis. Another missionary, Rubruquis, similarly failed, 1253, but wrote valuable account of travels (printed in Purchas's *Collection*), and P. J. formed continual stimulus to mediaeval exploration. He is identified by modern scholars with Gur Khan, founder of empire of Black Cathay in XII. cent.

PRESTON (53° 46′ N., 2° 42′ W.), town, at mouth of Ribble, Lancashire, England. Here Scots Royalists were defeated by Cromwell, 1648; P. is important railway centre, and dredging of river has given strong impetus to shipping trade; manufactures cotton, has ship-building machinery and boilerworks; exports coal. Pop. 1921, 119, 900.

PRESTON, FRANCES FOLSOM CLEVELAND. See PRESTON, T. J.

PRESTON, JOSEPHINE CORLISS (1873), an American educator, *b.* in Minnesota, dau. of John Wesley and Josephine Kinney Corliss. She was educated at Carleton College, Northfield, Minn., and at Whitman College, Walla Walla, Wash. She began teaching in Minn. in 1887 and later was county superintendent of schools, Walla Walla County, Wash. for 3 terms, then wss appointed a member of the state board of education by Governor M. E. Hay, and in 1912 became state superintendent of public instruction, Washington.

PRESTON, THOMAS JEX (1852), an American archaeologist, *b.* in Hastings-on-Hudson. He studied at Columbia University and in Paris and Rome, and was director of the American School of Classical Studies in Rome. He married, in 1913, Frances Folsom Cleveland, widow of Grover Cleveland.

PRESTONPANS (55° 57′ N., 2° 59′ W.), village, Haddingtonshire, Scotland, on Firth of Forth; scene of Jacobite victory over Royal forces (1745).

PRESTWICH (53° 32′ N., 2° 17′ W.); town, Lancashire, England; cotton manufactures. Pop. 17,500.

PRESTWICH, SIR JOSEPH (1812-96), Eng. geologist; awarded Wollaston Medal, 1849, for essays on geological subjects; prof. of Geology, Oxford, 1874-87; knighted 1896.

PRETENDER, THE, See CHARLES EDWARD STEWART, PRINCE, and JAMES, THE OLD PRETENDER.

PRETORIA (25° 53′ S., 29°76′), city, South Africa, seat of administration of Union of South Africa, and capital of Transvaal Province; founded by Boers 1855; entered by Lord Roberts, 1900; after which it became Brit, headquarters in South African War. 1900-2; fine government buildings under construction; railway and distributing centre, in midst of rich mining and agricultural district. Pop. 1921, 73,770.

PRETORIUS, ANDREAS WILLIAM JACOBUS (1799-1853); Boer general; a leader in *Great Trek* from Cape Colony; settled in Natal, 1838; drove off Zulus and founded repucluc of Natalia, 1838; Britain sent troops to occupy Natal

which became Brit. colony, 1843; P petioned against misrule, 1847; headed Transvaal revolts, 1848 and 1851, and secured establishment of Orange Free State.

PREVENTION OF CRUELTY TO ANIMALS. See ANIMALS, PREVENTION OF CRUELTY TO.

PREVEZA, PREVESA (38° 56′ N., 20° 42′ E.), seaport, Albania, European Turkey, on Gulf of Arta. Pop. 7400.

PRÉVOST D'EXILES, ANTOINE FRANÇOIS, ABBÉ PRÉVOST (1697-1763); Fr. author; produced two hundred novels but owns renown solely to *Manon Lescaut* (1733), a book unique in the century; it is a history of Parisian Bohemians by an accurate observer.

PRIAM (classical myth.), old king of Troy, father of Hector, Paris, Troilus, Cassandra; only once mentioned in Homer—when he begs Hector's body from Achilles.

PRIAPULOIDEA, a class of unsegmented worm-like animals, with mouth and anus at opposite ends of body.

PRIAPUS, one of the lesser deities of classic mythology, especially honored at Lampsacus. Usually represented as the son of Dionysus and Aphrodite, he was, above all, the patron of gardens and vineyards, the god of reproduction, extending his protection to shepherds, farmers, and fishermen.

PRIBILOF ISLANDS (58° N., 170° W.), group of islands, Bering Sea, belonging to Alaska; seal fisheries.

PRIBRAM (49° 42′ N., 14° 1′ E.), town, Bohemia, Czecho-Slovakia; lead and silver mines. Pop. 13,000. mines. Pop. 13,000.

PRICE, RICHARD (1723-91); Eng. Noncomformist minister who wrote on economics, and politics; wrote *Review of the Principal Questions in Morals* (1756), in many respects akin to thought of Cudworth (*q.v.*); strongly opposed war with America and welcomed Fr. Revolution. His sermon, *On the Love of Our Country* (1789) provoked Burke's attack on him in *Reflections on the Revolution in France.*

PRICE, STERLING G. (1809-1869), Confederate army general; *b.* Prince Edward County, Va.; *d.* St. Louis, Mo. He removed to Missouri in 1832 after reading law, became speaker (1840) of the state legislature, and (1844) member of Congress. He resigned from the latter body on the outbreak of the Mexican war, in which he defeated the enemy in a number of engagements as head of a mounted troop of 2,000 men that invaded New Mexico and opened the way to the complete conquest of California. In 1847 he was promoted to brigadier-general of volunteers and became military governor of Chihuahua. The next year he won a decisive victory over the Mexicans at Cruz de Rosales. After the war he was governor of Missouri (1853-57) and State bank commissioner (1857-61). He took an active part in the secessionist question that divided the South prior to the Civil War, and when the conflict came he joined the Confederacy as major-general of the State troops, sharing in the battle that defeated the Union forces at Wilson's Creek in 1861. He captured Lexington, but was driven to retreat southward by Fremont. He fought at Pea Ridge and Corinth, suffered defeat by Rosecrans at Iuka, Miss., retreated with Beauregard, failed to capture Helena (1863), stopped Steele's advance toward the Red River, and made a raid into Missouri towards the close of the war, advancing as far as the Missouri river, but finally was driven back into Arkansas. His later years were occupied in a futile scheme to found a colony of Southerners in Cordoba, Mexico, in association with the Emperor Maximilian.

PRICHARD, JAMES COWLES (1786-1848), Eng. physician and ethnologist.

PRICKLY HEAT or **MILIARIA POPULOSA** a skin disease common in tropical and semi-tropical lands. It is characterised by inflammation of the sweat-glands, leading to the formation of small red papules, and accompanied by a pricking or tingling sensation. It usually follows an excessive flow of prespiration; it is unaffected by any treatment.

PRICKLY PEAR. See CACTUS.

PRIEGO DE CORDOBA (37° 28′ N.; 4° 14′ W.), town, Cordoba, Spain; oil and wine. Pop. 17,400.

PRIENE, ancient Ionian city, Caria, Asia Minor.

PRIEST, derived from *presbyter* (*i.e.* elder), an order in the Christian ministry, and also applied to ministers or officials of non-Christian religion. The idea of priesthood is difficult to define, but it might almost be said that a p. is a person who offers sacrifice; the word is generally used of some one who performs a sacred office, very often with the idea besides of divine sanction or authority. In early times religion and magic were intermingled, and the functions of p. and chief ruler were combined. Hence the survivals into historic times in both

Greece and Rome. In neither case was there a priestly caste, but in Athens the king-archon performed priestly functions and in Rome after the abolition of the kingdom the title of *rex* was retained by an official who performed certain sacrificial rites. But in later times in Greece and Rome priestly functions were performed by ordinary magistrates. There was no hereditary priesthood in Rome and not much of one in Greece. In Rome the priestly offices were of considerable political importance.

In ancient Assyria and Babylonia there were various officials who performed sacred rites, but some scholars would hardly call them all P's. In ancient Egypt, P's tended to be, as in Rome, mere state functionaries. In India the priesthood, to which only Brahmans could be admitted, possessed greater power than almost anywhere else. The place of the priesthood in Jewish religion is peculiar, for the primitive Semites had no real priesthood, but a priesthood gradually grew up which had charge of the Temple sacrifices. Since the destruction of the Temple, in A.D. 70, there have been no more P's in Judaism, and Christian priesthood has taken over some ideas from Judaism. In the *Epistle to the Hebrews* Christ is the High Priest. In Protestant Churches P. denotes a member of the second order of clergy, like P's of R.C. and Greek Churches, performs sacred functions not reserved for bishops.

PRIESTLEY, JOSEPH (1733-1804), Eng. scientist and Unitarian divine; studied Oriental and modern languages; devoted himself to chem.; became famous by his discovery of oxygen; sympathized with Fr. Revolution; his books and apparatus were destroyed by mob; migrated to America, 1794.

PRILEP, or **PRILIP** (41° 2′ N.; 21° 35′ E.), town, Jugo-Slavia (Macedonia) 25 miles N. by E. of Monastir; citadel. During the World War was captured by the Bulgars, Nov. 16, 1915; retaken during the Allied advance, Sept. 23, 1918. Pop. 11,000.

PRIM, JUAN, MARQUIS DE LOS CASTILLEJOS (1814-70), Span. general; distinguished in war with Morocco, 1860; assisted Serrano in revolution against Queen Isabella, 1868; pres. of council and marshal, 1869; assassinated.

PRIMARY ELECTIONS AND NOMINATIONS. See ELECTORAL REFORM.

PRIMARY SCHOOLS. See EDUCATION, SCHOOLS, COMMON.

PRIMATE, title in Rom. Empire, both civil and ecclesiastical; now only ecclesiastical; used of a chief bp. in West (like patriarch in the East). The Abp. of Canterbury is *P. of all England*; the Abp. of York, *P. of England*. The Abp. of Lyons is *Primat des Gaules*.

PRIMATES, an order of mammals; lemurs, monkeys, apes, and man—the order which, on account of its highly developed brain, and its watchfulness over offspring, is placed highest in the animal kingdom. The majority of monkeys are familiar on account of their semi-erect gait, and their faces caricaturing the human countenance, but the less specialized individuals, and the lemurs, have little external resemblance to their man-like relatives. The following characteristics which Primates have in common will serve to distinguish them from the other orders of mammals. The eyes, instead of lying at the side of the head, are in front, and look almost straight forward, and the eye socket, or orbit, is completely surrounded by a ring of bone. The brain cavity is large, and the cerebral hemispheres of the brain are often much convoluted. The limbs are long, and neither the thigh-bone nor the upper arm-bone is hidden in the body. Both hands and feet are grasping organs (except the human foot), and both have five digits, the great toe, at least, having a flattened nail, except in the orang-utan, where the nail is sometimes absent. Again, the thumb, or the great toe, or both, lies away from and can be opposed to its fellow-digits; and, lastly, all the females, except the aye-aye, with inguinal mammae, have at least two mammar on the breast.

The Primates are, on the whole, fitted for life in forest regions, where they are to be found in companies, climbing by hands, feet, and often tails, roosting in the trees, but seldom traversing ground. They live mainly upon fruits and leaves, but some devour spiders, insects, eggs, young birds.

Primates are warmth-loving animals, found only in tropical and sub-tropical regions, although aome venture among the snows of the Himalayas. They are scattered over both Old and New Worlds, but the inhabitants of the one differ in marked characters from the inhabitants of the other. In Europe, the only representatives are the Barbary apes, which dwell on the rock of Gibraltar.

PRIME MINISTER, PREMIER, chief minister of Brit. Government; position developed with party system, P.M. being at first unofficial head of party in power; recognized from Walpole's time; legal recognition of office, 1905. The Australian Commonwealth has a 'Prime Minister'; the Australian States have 'Premiers'. The Fr. *Presi-*

dent du Conseil corresponds to Brit. Premier.

PRIMOGENITURE, the state of being the first-born child of the same parents; in English law the term has become more specialized and denotes the right by which, on intestacy of the father, the *eldest* son or his issue succeeds to the real estate to the absolute exclusion of the younger *sons* and *daughters*.

PRIMROSE (*Primula vulgaris*), an abundant indigenous species, possessing a rosette of crinkled sessile leaves, and bright yellow flowers which appear in spring. The flowers are dimorphic, one type showing a long style with anthers inserted midway up the corolla tube; the other short-styled, with anthers at the top.

PRIMROSE LEAGUE, THE, Conservative association founded, 1883, in memory of Beaconsfield (the primrose being his favorite flower); chief promotors, Lord Randolph Churchill, Sir John Gorst, Sir H.D. Wolff; objects—to uphold religion, the Union, and Brit. imperial ascendancy; organized into different 'Habitations' (*i.e.*, lodges); observes 'Primrose Day', April 19 (anniversary of Beaconsfield's death).

PRIMULACEAE, herbaceaous perennials, with pentamerous flowers, the five stamens being opposite the petals; ovary is formed by five carpels, with free central placentation; include primrose, cowslip, cyclamen, pimpernel, and water violet.

PRINCE (Lat. *princeps*, first, sovereign), The principal uses of the word are: (1) Sovereign of a sub-state (principality), not a duchy or county, *e.g.*, P. of Monaco; (2) members of royal family in most European countries. After XI. cent., Welsh kings were only known as P.; hence title P. of Wales, granted to king's eldest *s.*, 1301; other children of Eng. sovereign were not called P's till reign of James I. The use is probably derived from title *princeps juventutis*, bestowed on designated successor to Roman Empire.

PRINCE EDWARD ISLAND (from 1534 to 1798 known as *Isle St. Jean*), Maritime Province; smallest and most densely populated (42·91 to sq. m.) of the provinces of Canada; in Gulf of St. Lawrence; separated from New Brunswick and Nova Scotia by Northumberland Strait (9 to 30 m. wide); very irregular in outline; arms of sea divide it into three peninsulas; shores low and sandy; surface undulating (400 ft.); originally heavily forested with beech, mapel, fir, etc.; most now cleared and used for agricultural purposes. Cereals are chief products; dairy farming is important (cheese and butter are largely exported); fisheries valuable (mackerel, cod, herring, lobsters, and oysters). Silver fox ranching is making great progress (see FUR). Mild climate; ports closed by ice Dec. to May. Capital, Charlottetown. Lieut.-governor is appointed by Dominion and legislative Assembly (30 members, for four years). Four senators and four members of House of Commons in Dominion Parliament. There are two colleges, one affiliated with M'Gill Univ.; 278 miles of railway; linked with Intercolonial Railway by car ferry steamer. Inhabitants mostly of British descent. Education free and obligatory. Settled by French, *c.* 1719; captured by British, 1755; passed into Brit. possession, 1763; separate prov., 1769; entered Confederation, 1873. Area, 2,184 sq. miles. Pop. 93,700.

PRINCE, JOHN DYNLEY (1868), a diplomat; *b.* at New York City; *s.* of John Dynley and Anne Maria Morris Prince. He was educated at Columbia, the University of Berlin, and at Johns Hopkins University. He was professor of Semitic, and later Slavonic, languages at Columbia until 1921, when he was appointed E.E. and M.P. to Denmark, by President Harding. He wrote several books and contributed to philol., anthrop., and scientific journals.

PRINCES' ISLANDS (40° 52′ N., 29° 5′ E.), group of islands, in Sea of Marmora, Turkey; ancient *Demonesi*. Pop. 11,000.

PRINCETON, a city of Indiana, in Gibson co., of which it is the county seat. An important grain and cattle market, it has also manufactures of glass, lumber, paints, bricks, tiles, and carriages. Pop. 1920, 7,132.

PRINCETON, a town in New Jersey, in Mercer co. It is on the Pennsylvania Railroad, and on the Delaware and Raritan Canal. It is noted chiefly as the seat of Princeton University. Here was fought the battle of Princeton, in the Revolutionary War, which resulted in a decisive defeat for the American Army. Pop., 1920, 5,917.

PRINCETON THEOLOGICAL SEMINARY, a Presbyterian divinity school, situated at Princeton, N.J. It was founded in 1812. The curriculum includes instruction in biblical, pastoral, and systematic theology, homilotics, literature, church and general history, and Hebrew. Students may also take collateral courses at Princeton University. Tuiton is free. In 1922, there

were 195 students, and a faculty of 15, under the direction of J.R. Stevenson, D.D.

PRINCETON UNIVERSITY.—A college of New Jersey; was projected, in 1736, by a committee of the Presbyterian Synod, in Philadelphia, but nothing came of it until 1746, when the promoters, who had meantime joined the Synod of New York, obtained a charter for the institution, and a second charter in 1748. The College of New Jersey was opened in April, 1747, noving to Newark the same year, and to Princeton, in 1756, where Nassau Hall, the first building, was opened for work. The Revolution interrupted the college course, for armies were present, and Nassau Hall was damaged and the library scattered. In 1783, the Continental Congress held sessions during several months in Nassau Hall. In 1846, a Law Department was established. The system of elective studies was introduced in 1870. The John C. Green School of Science was added in 1873; a Graduate School, in 1877; School of Electrical Science, in 1889; School of Architecture, and others. On the 150th anniversary of the founding of the college, the name of University was adopted. Five alumni are admitted to the Board of Trustees, since 1910, the other five being appointed to the board for life. The undergraduate course, requiring Latin examination, on entrance, leads to Bachelor of Arts, and Bachelor of Science, the latter requiring examination in a modern language on entrance. Graduates do advanced work in arts and sciences leading to degrees of Master of Arts (M.A.), and Doctor of philosophy (Ph.D.). In the undergraduate department there are 40 University scholarships, and 40 endowed scholarships of $100 to $500. There are also 100 memorial scholarships in honor of University men who fell in the World War, and 42 others that are personal, or class gifts. Part of the tuition fees of undergraduates of small means are remitted if they prove to be good scholars. Students may graduate in three years by taking independent studies in the summer. In the graduate school, there is the Jacobus Fellowship, 10 Proctor Fellowships of $1,000 each, and 35 of $600 to $700, and a number of graduate scholarships of $250 and upward. The Graduate College of residence was completed in 1912. The University library contains about 444,000 volumes and pamphlets, the Hall libraries 5,000, and the Theological library 110,000. The campus comprises 700 acres. Athletics are provided for by the Palmer Memorial Stadium, Brokaw swimming tank, Brokaw, Poe, and Goldie fields for baseball, and soccer, and there are 30 tenni courts, etc. Productive funds of th University, about $7,000,000. Annua income, about $900,000. President John Grier Hibben. Students, 2,253 teachers, 232, 1922.

PRINCIPAL AND AGENT.—In law the relationship of principal and agen largely resembles that of master an servant. Generally the agent does no make contracts on his own behalf, bu is merely a conduit pipe and the repre sentative of his principal, and therefor the latter alone is usually bound by th agent's acts, and the agent himself doe not incur any liability.

PRINTING, the art of stamping im pressions of letters, figures, character or other designs with ink or pigment, o paper, parchment, or similar substance When such stamping is done on cloth the process is known as *Textile Printing* Printing may be said to be of thre kinds: (1) *Copper-plate*, the basis o which is a metal plate, generally copper having the necessary letters or desig sunk or engraved on its otherwise smooth surface. (2) *Lithographic Printing*, o *Lithography*, in which a perfectly fla and polished stone surface is used. Thi process, invented by Aloys Senefelder in 1796, though in some respects simila to letterpress printing, gives more beau tiful results, and is very suitable for th reproduction of works of art. (3) *Lette press Printing*, by far the commones and most used process of the three. I this process raised letters are used, thei surfaces inked, and the ink transferre to paper. Printing from fixed typ seems to have been used more or les in very early times, and the rudiment of letter-press printing were known t the ancients; printing with movabl types was probably practiced in Chin about the XII. or XIII. cent., whil books were printed in Korea by mean of movable types of clay or wood in th early XIII. cent.

Johannes Gutenberg, if not the actua inventor of movable type, certainly di a great deal to set printing on a firm footing. L.J. Coster started busines between 1420 and 1430 at Haarlem; hi first types were of wood, but later h used lead and tin. Perhaps the earlies specimens of printing with movabl types was *Speculum Mostroe Salutis*, b P. Schoffer. Gutenberg. with Fust an Schoffer, set up a printing house a Mainz, and about 1455 they published Lat. Bible, called sometimes 'the forty two line Bible,' because each colum had 42 lines.

Printing now made rapid strides i Europe. Workmen left the origina printing houses and carried their ar

with them, either taking service with other employers or setting up business for themselves. Printing was established at Naples in 1465; at Rome, by Sweynheim and Pannartz, 1467; at Venice and Milan, 1469; at Paris, 1470; at Nuremberg and Verona, 1472; at Westminster, by William Caxton (first printing establishment in England (1476; and at Oxford, in 1478, by Theo. Rood; and at Constantinople, in 1490. After this the art spread to almost every continental city, and also to Russia. Some of the early printers other than those above mentioned were: the Aldi of Venice, 1490-1597; Baden of Paris, 1502-98; Plantin of Antwerp, 1514-89; Wechel of Paris and Frankfort, 1530-72; Elzevir of Leyden and Amsterdam, 1588-1680; and Bodoni of Parma, 1768-1813.

A censorship of printing was established in 1530, for England, and printers were so abused and imprisoned that for a time the art almost became extinct in the country. In 1694, however, the censorship was abolished, and a revival in printing followed. No radical improvements were effected until mid-XIX. cent., when machines to lighten labor were introduced; the improvements in speed and the introduction of machine printing rendered the daily newspaper a possibility.

Printing Presses.—The first printing press was probably some sort of contrivance used by Gutenberg, and no doubt it was constructed of wood. The presses used in the early part of the XVII. cent. were wooden ones, and resembled the old winepress in design. An upright frame held in place a flat table of smooth wood or stone. The paper was held in a frame parallel to the table, and was screwed down upon the inked type resting on the table. Joseph Moxon wrote *Mechanick Exercises as applied to the Arte of Printing, 1683*, and the existing kind of press was improved by Blaeu. The earliest illustration of a press, dated 1607, shows how primitive the press was. It remained in this state until the close of the XVIII. cent. In 1800, Charles Mahon, third Earl of Stanhope, invented the iron printing press. It had an upright frame, but in design was different from its predecessors, enabling a greater power to be obtained. With this press some 200 copies per hour, printed on one side, could be taken. In 1823, the Albion press was invented, by R.W. Cope of London, and soon after, Clymer, and American, introduced the Columbian.

Probably the first newspaper to be printed by steam-driven printing machine was the *Times* of Nov. 28, 1814, 900 sheets per hour being printed on both sides, but by two distinct operations. Small iron hand-presses are still used at the present day for pulling proofs, while small platen machines worked by treadle (or by power, when employed continuously) are used for printing cards, circulars, etc. The design of these machines is practically the same as the old Albion and Columbian machines, although minor improvements have been added as experience suggested. Single-cylinder machines are used where one side of the sheet only is printed, and machines which print both sides of the sheet are called perfecting machines. The sheet is perfected before leaving the press, but is printed on both sides by different operations. The greatest developments in the making of printing presses have resulted from the work of Richard Hoe and his successors. Two-color machines have only one cylinder, which, however, has two printing surfaces and two sets of inking apparatus. Rotary printing machines are used for that class of work in which rapid dispatch is required, as in newspapers and periodicals. The paper is contained on great reels, and is wound in at one end of the machine, only to issue from the other in printed, cut, and folded copies. The cycle of operations is too complex to give here.

Letterpress Printing is the process mostly used for general work. The letters or characters are cast on a piece of metal. A complete set of type is called a *font*; each type is notched, so that the compositor may place it properly. The fuont is contained in trays or *cases*, which stand on a frame. The trays are divided into compartments, each of which contains types of a certain letter. These compartments are so placed that those types which are most often used are close to the compositor's hand. The names of types in general use are given elsewhere, but as these tend to vary slightly in size, the point system has come into use as the standard, with 72 points to an inch, pica being 12 point.

This type is called Pica.
This type is called Small Pica.
This type is called Long Primer.
This type is called Brevier.
This type is called Nonpareil.

In hand-setting, the compositor picks up the required letters, places them in a setting stick, a kind of box-like arrangement which holds them in place; when sufficient lines have been arraged they are transferred to the galley, a brass tray with wooden sides. A proof is now 'pulled' by a hand-press and read over by a printer's reader, who corrects any errors and returns it to the compositor

for amendment. A 'clean proof' is then taken for the author, who makes his alterations thereon. These alterations are technically known as 'author's corrections.' A book with a small number of copies is printed direct from the type, but if, on the other hand, a large number of copies are required, the type is stereotyped—*i.e.*, a metal plate of each page is made, amd copies are printed from these plates.

Type-setting by hand has now to a great extent been superseded by mechanical composition. Various machines have been invented and patented for this purpose, from that of Church, in 1822, to the marvelous machines of today; but the principal ones now in use are the linotype and the Lanston monotype machines. The first of these, invented by O. Merganthaler, is now very largely used in newspapers, for which it is most suitable. It produces the types in a solid line. The monotype machine casts the types separately, and is used by some newspapers, and by most large

Signs and Abbreviations.

Delete; take out marked type, word, or sentence.	Move to right.
Reverse type.	Indent line
Insert a space, or more space.	New paragraph.
Less space.	Range lines.
Close up.	Range letters or lines.
Take out and close up.	Push down appearing space.
Move to left.	Change broken type.

w.f., wrong font; *tr.*, transpose; *l.c.*, lower case type or small letters; *s.c.*, small capital letters; *caps.*, capital letters; *rom.*, change italic to roman; *ital.*, change roman to italic; *stet.*, retain what is crossed out.

Specimen 'First Proof.'

JOHNSON.

By Thomas Carlyle.

As for Johnson, I have always considered him to be, by nature, one of our *great* English souls. A strong and noble man; so much left undeveloped in him; in a kinder element what might he not have been, Poet, Priest, sovereign ruler! On the whole, a man must not complain of his 'element,' of his time,' or the like; it is thriftless work doing so. His time is bad; well, then, he is there to make it better.

Johnson's youth was poor, isolated, hopeless, very miserable, indeed, it does not seem possible that, in any ~~the favourablest~~ outward circumstances, Johnsons life could have been other than a painful one. The word might have had more of ~~profitable~~ *work* out of him, or less, but his effort against the world's work could never have been a light one. Nature, in return for his nobleness, had said to him, live in an element of depressed sorrow. Nay, perhaps the nobleness and the sorrow were intimately and even inseparably connected with eachother. At all events, poor Jonson had to go about girt with continual hypochondria, physical and spiritual pain. Like a Hercules with the burning Nessus shirt on him, which shoots in on him dull, incurable misery: the Nessus'-shirt not to be stript off, which is his own natural skin.

Proof-reader's Marks.

printing houses engaged in book production.

In *Three-color Printing* by the letterpress method, fully colored pictures are produced from three blocks, printing yellow, red, and blue respectively. Remarkably good results are thus obtained. Great care must be taken to obtain exact 'register' of the different colors.

Textile Printing is the art of ornamenting woven fabrics by printing designs in color. The art is of very ancient origin. The design may be imprinted by stencil, wood blocks, or engraved plates or rollers. The ink is thickened and specially prepared to prevent its running and spoiling the design, while it is also rendered 'fast' to prevent washing out.

PRINTING BLOCK. See BLOCK PRINTING.

PRINTING, COLOR. See COLOR PRINTING.

PRINZIP, GAVRILO, the assassin of the Austrian Archduke Francis Ferdinand and his morganatic wife, the Duchess of Hohenberg, whose murders were the immediate cause of the World War. Prinzip, a young Bosnian student, and an ardent Serbian patriot, shot the archduke and duchess, on June 28, 1914, as their carriage passed through the streets of Serajevo, the capital of Bosnia, which they were visiting to attend some military manoeuvres in the then Austrian province. Both died almost immediately. Some little while before Prinzip fired, a bomb was thrown at their carriage, injuring members of the archduke's staff who occupied the equipage following it. The injured were hurried to a hospital, and the archduke determined to visit them. He and his wife were on their way to the hospital when the fatal bullets came. Prinzip died in prison, in 1916, while awaiting trial.

PRIOR, ecclesiastical title given to monastic officials, and then technically to one ranking immediately after the abbot; some orders called the head of a house 'prior.'

PRIOR, MATTHEW (1664-1721), Eng. poet. His early training was under the care of an *uncle*, a vintner in Channel Row. Under Anne, he rose to be an ambassador, but it is as a writer of light verse rather than as a diplomatist that he is remembered.

PRISCIAN, PRISCIANUS, surnamed **CAESARIENSIS** (fl. VI. cent. A.D.), Latin grammarian; *b.* in Mauretania; lived in reign of Anastasius and taught rhetoric and grammar at Constantinople.

PRISCILLIAN (*d.* 385), Span. heresiarch; founder of heresy bearing his name; preached rigid asceticism, denouncing marriage; burned to death at Treves; followers afterwards persecuted; his views preached later by the Cathari.

PRISHTINA, PRISTINA (42° 30′ N.; 21° 18′ E.), town, vilayet Kossova, European Turkey; occupied by Balkan Allies, 1912-13. Pop. 18,000.

PRISM, a solid figure whose sections across the longitudinal axis at any point when parallel give the same figure. The shape of the figure gives the name to the P.: triangular, rectangular, etc. The lines joining the vertical of two such sections determine the bounding planes. Its volume is found by multiplying the vertical height by the area of the base.

PRISON, place of confinement for ill-doers. The aim of P's has varied considerably; originally mere detention of person wanted by justice; punishments were then death, fines *in re*, corporal chastisement, and torture. Humaner ideas suggested imprisonment. From then till last cent. the aim of imprisonment seems to have been slow torture; prisoners were treated like wild beasts left in damp, disease-ridden, and filthy quarters, in rags, and with insufficient food.

It is significant that the Fr. Revolution started by razing the most notorious prison of the time (the Bastile).

PRISON ASSOCIATION, AMERICAN.—Founded in Cincinnati, Ohio, in 1870; Rutherford B. Hayes, president. It developed from a movement in New York City, in 1846, which led to the foundation of the Prison Association of New York. Annual meetings are held. There is a board of directors and executive committee of seven. There are also standing committees on criminal law, prison discipline, etc. Prison officials and experts in criminology discuss prison questions at the annual congresses.

PRISON REFORM.—The modern conception of punishment of crime by imprisonment has diverged widely from the barbarous views held by former generations and put into inhuman practice without regard to health, cleanliness, or morals. English prisons, in the XVIII. cent., were public dens of iniquity. The belief duly dawned on Parliament that such institutions might usefully be reformed so that sobriety, sanitation, medical aid, work, solitary hours of confinement, except during hours of work, and religious instruction, could be employed in the treatment and discipline of convicts. The new system

was adopted, and became the basis of prison reform in all countries.

In the United States, after the Revolution, the Quakers waged war on gross prison conditions, and devised the Pennsylvania, or Separate prison system. Under this system, prisoners ate, worked, and slept in their cells apart from all other inmates. The Auburn, or Silent system, adopted by the State of New York, in the prison built at Auburn, in 1816, worked the convicts in community by day and separated them at night. The Auburn plan became adopted generally in America, and the Pennsylvania plan in Europe. The Quakers succeeded in abolishing mutilation and whipping, and effected other changes whereby a prisoner's treatment and durance depended upon his good conduct and industry. A third plan, known as the Irish Prison System, was established at Elmira, in 1876, based upon the Auburn method, but less rigidly observed because applied to young first offenders.

Prisons were later improved by the installation of steam heat, electric lights, modern sanitary conveniences, facilities for recreations and sports, study and vocational training, and profitable employments in work congenial to individual prisoners. Modern penology, becoming more than ever humane and regardful of protecting new offenders from the evil influences of mixed prison surroundings, seeks (among other reforms) the provision of adequate detention prisons for those awaiting trial; reception prisons to which all offenders can be committed by the courts immediately after conviction, to be observed and classified; educational, industrial, and training-school prisons for younger offenders; hospital prisons for the criminal insane; and custodial prisons for very feeble-minded, and other abnormal types, and for habitual offenders. It is agreed that classification is a fundamental basis of prison administration, and can be effected only by the provision of different types of prisons.

PRITCHARD, CHARLES (1803-93), Brit. astronomer; schoolmaster and Savilian prof. of Astron., Oxford, 1870.

PRITCHETT, HENRY SMITH (1857), an American educator; *b.* at Fayette, Mo.; *s.* of Carr Waller and Betty Susan Smith Pritchett. He was educated at Pritchett College, and at Munich. After various connections as astronomer and professor of same, he was supt. of the U.S. Coast and Geod. Survey, from 1897-1900, and then, until 1906, was president of the Mass. Inst. of Tech., after which he became president of the Carnegie Foundation for Advancement of Teaching.

PRIVATEERS, armed vessels owned and officered by private individuals, but acting under a commission from the state, known as 'letters of marque,' which allowed the owners to keep the prizes which they captured. By the Declaration of Paris, 1867, privateering was, and remains, abolished between the signatory nations when engaged in war with each other.

PRIVET, or **LYGUSTRUM,** a genus of evergreen shrubs. Common P., *L. vulgare,* a native species, is a useful hedge plant, especially in towns.

PRIVY COUNCIL, body of advisers of Brit. Crown. Its original was Great Council of Norman kings composed of magnates of realm. Great Council became House of Lords of new Parliament and also developed into Privy Council which existed as separate body (*consilium regis*) in XIV. cent. Instead of general body of tenants-in-chief, the Council was composed in 1404, of three bp's, nine lay lords, six knights, and one lesser councillor. Under Tudor and Stewart, 'King in Council' sought to exercise authority of king and council of early feudal times; lost power, 1640. Cabinet appeared in XVII. cent. and was organized by Charles II.; and various boards, *e.g.,* Board of Trade, Board of Education, have assumed other functions of Privy Council.

PRIZE FIGHTING. See BOXING.

PRIZE OF WAR is property captured by a beligerent at sea, either from vessels of the hostile nation, or from vessels violating neutrality, or from subject vessels having dealings with the enemy. The right to prize is determined by a prize court according to the rules of international law.

PRIZREN, PERZERIN (42° 8′ N., 21° E.), chief town, Kossovo, European Turkey; seat of Roman Catholic abp. and Greek. bp.; active trade; former capital of Servian kings; manufactures glass and weapons. Pop. 21,300.

PRJEVALSKY, NIKOLAI MIKHAILOVICH (1839-88), Russ. Asiatic traveller and writer; sent out by Russ Imperial Geographical Soc. and visited hitherto unexplored regions of Central Asia; made important geographical and scientific discoveries.

PROA (Malay *prahu*), a species of canoe used by the natives of the Indian and China seas. To leeward the craft is quite straight from stem to stern, whilst to windward, it is rounded and therefore normal. It is propelled with the aid of a lug-sail of matting, and there

a weighted framework swung out from the side to adjust the balance.

PROBABILITY, a branch of algebra which deals with the chance of occurrence of any one of a number of possible events, one at least of which must occur.

PROBATE.—The proving of a will. P., or Letters of Administration, cannot be taken out till a week after the testator's death, but must be taken out within six months, or the executors are liable to penalties. In the U.S.A. probate is granted in some states by the ordinary chancery or common law courts, but usually by courts of special jurisdiction, such as the prerogative court in New Jersey, the surrogate's court in New York, the orphan's court in Philadelphia. Probate in solemn form, that is, after due notice to all parties in interest, is the most common form in the U.S.A.

PROBATION, proof; a person app. to an office is on P. when the appointment is not finally ratified until there is assurance that the person so app. will give satisfaction.

PROBOSCIDAE, ELEPHANTS (*q.v.*).

PROBISCIS, an elongated nose, such as that of Elephants or Tapirs, applied also to almost any elongated or protrusible mouth organ, as in many Worms, butterflies, and moths, etc.

PROBUS, MARCUS AURELIUS (235-82 A.D.), a noted Roman general; Emperor of Rome, 276-82. He fought successfully against the Germans, driving them out of Gaul, but was murdered by mutinous soldiers. *See* Aurelius Victor, *De Caesaribus*, and *Epitome*; Champigny, *Les Cesars, 1843*.

PROCAVIA, CONIES (*Procaviidae*, or *Hydracoidea*(, a sub-order of small Ungulate Mammals confined to Syria, Arabia, and Africa. They are small, brownish-grey, rabbit-like animals, with short snout, ears, and legs, and very small tail.

PROCESS, in law, the whole course of proceedings in a civil or criminal cause. In a more limited sense P. denotes either (*a*) the writ of summons, warrant, or other instrument by which the defendant is compelled to appear in court, or (*b*) the writs which issue at the instance of a party to a suit to compel the other party or some third persons to do some act connected with the proper trial of the action, *e.g.*, a writ of *subpoena duces tecum*, to compel the production of documentary evidence. In Scots law P. means the proceedings in a cause and the document relating to it.

PROCESSION, a number of persons going ceremonialy in ordered array. P's have been common in both religious and secular life, especially the former; religious P's were a regular part of official Gk. and Rom. religion. Their beginning in the Christian Church does not date certainly farther back than IV. cent., though they may be older. The eucharistic P's are somewhat later. Processional litanies were early in use; these were penitential in times of disaster.

PROCIDA (40° 56′ N., 14° 3′ E.); volcanic island, Italy, W. of Bay of Naples; ancient *Prochyta*. Pop. 14,600.

PROCOP THE GREAT (*c.* 1380-1434) Hussite leader; became general of Taborites on death of Zizka; spread terror over Europe; ruled Bohemia till death in battle of Lipan. With him fell his great general, Procop the Little.

PROCOPIUS (fl. VI. cent.), Byzantine historian; became chief adviser of Belisarius, *c.* 527, and went with him to African, Ital., and Pers. wars, which he described; settled in Constantinople from 542 to death, about 562. Chief works: *Books of the Wars*; the *Anecdota* or '*Secret History*,' a scurrilous attack on Justinian and Theodora; *The Buildings of Justinian*; chief source of history of time.

PROCRUSTES, DAMASTES, POLYLYPEMON, a robber of Attica who placed victims on a bed ('Procrustean bed'); if too tall he hewed off their limbs, if too short he racked them; Theseus slew him.

PROCTER, BRYAN WALLER, 'BARRY CORNWALL' (1787-1874), Eng. poet of little merit; fame rests on his personality; his friends included Lamb, Keats, Scott, Tennyson, Dickens. His *dau.*, Adelaide Ann, 1825-64, was also a poet.

PROCTOR, a shortened form of Procurator, meaning one who acts on behalf of another.

PROCTOR, EDNA DEAN (1829); poet; *b.* Henniker, N.H. She acquired considerable note as a poet, especially for her poems *Heroes* and *Shenandoah*, and published a number of volumes, from 1866 to 1916, the last *The Glory of Toil* and *Other Poems* when she was 87 years of age. She was formerly a frequent contributor to magazines.

PROCTOR, REDFIELD (1835-1908); an American public official, *b.* in Proctorsville, Vt. He graduated from Dartmouth College in 1851. After service in the Civil War he practiced law in Vermont. He was elected governor of the State in 1878, and was appointed Secre-

tary of War in 1889. He resigned to become a Senator in Washington, which he held until his death.

PROFESSOR. Among the Romans this term was applied to certain public teachers. In mediaeval universities it signified the possession of a license to teach, and was practically synonymous with 'Doctor' or 'Master.' Such license was then the only degree, granted to students, but later a separate class of recognised lecturers sprang up, to whom the title of P. was applied.

PROCTOR, RICHARD ANTHONY (1837-1888), astronomer; *b.* Chelsea, London; *d.* New York. In 1863, he was attracted to astronomy and mathematics, after studying at King's College, and Cambridge, and reading law, and became an exponent of popular science by lecturing and magazine contributions. He was editor of the Royal Astronomical Society's *Proceedings*, 1872-3; lectured in the United States on repeated tours, between 1873 and 1884: settled in St. Joseph, Missouri, following a second marriage, and later removed to Florida. He was the founder of *Knowledge*, a popular British scientific periodical. His books included *Other Worlds than Ours*; *The Universe of Suns*; and *Other Suns than Ours*.

PROCURATOR, literally one to whom a charge has been committed by another person; name of various officials in middle ages, and of administrator in certain religious houses. In Scotland, the *P.-fiscal* is a public prosecutor app. by the sheriff.

PRODUCTION, meaning the Production of Wealth, is one of the great divisions into which political economists arrange their subject, distinguishing it thereby from the Distribution of Wealth.

PROFIT-SHARING, a system of industrial reform by which the employees of a firm or corporation are given a share of the profits, with the object of enlisting their interest in the financial success of the enterprise. It was first formulated as a plan and advocated by a group of intellectual professional men in England, in the middle of last cent., known as the Christian Socialists. At the head of these reformers were Vansittart Neale, Tom Hughes, Charles Kingsley, and Jacob Holyoake. At first, their proposal not only included Profit Sharing, but an increasing degree of participation in ownership and control as well, but the Profit Sharing phase of their propaganda only survived. Within the past few years there has been a revival of interest in this old plan on the part of American manufacturers and welfare workers. Labor organizations, as a general rule, are decidedly opposed to it, on the grounds that it will be made a pretext for the lowering of wages. The most notable success of the system is that in the Ford automobile plants, instituted in 1914, in which from $10,000,000 to $30,000,000 a year has been distributed among the employees. In few, if any, other instances does the plan manifest such substantial benefits. Various methods of carrying it into effect are practiced. A certain percentage of the firm's net profits are allocated to the Profit Sharing fund, which is divided among the employees, usually those who have been over a year or two in the firm's employ, the share of each being in proportion to his wages or salary. Some firms do not pay in cash, but set aside the amount to the credit of their employees, applying it to the purchase of shares of stock in the corporation. This method has been largely followed by the U.S. Steel Corporation. In other cases the benefits are set aside as a future pension, or applied to an insurance fund.

PROGNOSIS, the forecast of the course and termination of a disease.

PROGRESSIVE PARTY, THE.—An organization composed chiefly of former Republicans, who broke with their old party because of discontent with its conservatism, and put forth condidates and a platform of their own, in the Presidential election of 1912. The Progressive spirit had been manifested in the vigorous protests voiced chiefly by Western Republicans against the tariff legislation of their party. For some years prior to 1910, the Progressive element in the House of Representatives had sought to have the Committee on Rules elected by the House itself instead of being appointed by the Speaker. In the latter year that change was ordered, and the committee enlarged from five to ten members. Following the Congressional elections of 1910, the Progressive element, led by Beveridge of Indiana, La Follette of Wisconsin, Cummins and Dolliver of Iowa, became so insistent and aggressive that a party split was threatened. In 1812, the Progressives were so confident of their own strength that they sought to control the Republican National Convention. The machinery of the convention, however, was in the hands of those who advocated the renomination of President Taft, and because of the alleged 'steam roller' methods employed, the Progressives withdrew, and on the 5th of August, held a convention of their own, at which Theodore Roosevelt of New York, and Hiram Johnson of California, were chosen as the candidates

for President and Vice President, respectively. The platform adopted by the new party declared for preferential primaries, national regulation of interstate corporations, immediate downward revision of the tariff, conservation and control of natural resources, equal suffrage for men and women, the establishment of a Department of Labor, readjustment of the business methods of the National Government, prohibition of child labor, a system of social insurance and the minimum wage for working women. Other provisions of the platform differed little from those of the Republicans.

From the beginning of the campaign it was evident that the Roosevelt following was much greater than that of Taft. As most of the Progressive strength, however, was drawn from the Republican Party, it became a foregone conclusion that the Democrats would win. When the election took place it was found that the Progressives, had carried California, Michigan, Pennsylvania, Minnesota, South Dakota, and Washington, with an aggregate of 88 electoral votes. Utah and Vermont, with eight electoral votes were the only states carried by the Republicans. The popular vote for Roosevelt was 4,126,020 votes, as compared with the 3,483,922 votes cast for Taft. The victorious Democratic candidate, Woodrow Wilson, had 435 electoral votes and a popular vote of 6,293,019.

While the Progressives did not win, they nevertheless felt that they had accomplished their purpose in rebuking the 'stand pat' tendencies of their old party, and the great bulk of them returned to their former allegiance. In the 1916 campaign there was no separate Progressive ticket, and Mr. Roosevelt, with a great majority of his followers, supported Mr. Hughes.

PROHIBITION. See under LIQUOR REGULATION and TEMPERANCE.

PROJECTILES.—A knowledge of the laws of flight of projectiles is the basis of gunnery, and is the subject of the science of *ballistics* (from Gr. *ballo*, 'throw'). The projectile is the thing thrown: its path, the trajectory. Considering only the action of gravity, acting vertically downwards, and of the driving force that impels the projectile, the trajectory is a parabola, the path to the highest point being exactly reproduced on the opposite side of the origin. But under the resistance of air the trajectory loses its symmetry, the descent from the highest point being sharper than the path to it. The resistance depends on the velocity, shape, size, and mass of the projectile.

The velocity of shot had been measured as early as 1742 by the *ballistic pendulum* of B. Robins, and nearly a cent. passed before the invention was superseded. The science is now so complete that time of flight, elevation, and penetration (factors included in tables drawn up for every weapon) can be computed as well as the charge, size of chamber, shape of projectile, length and thickness of weapon.

The part of ballistics which treats of the gun's properties is called *interior ballistics*. It has for its problems the pressure of the explosive gas and the strains produced in the gun. From one point of view the gun is merely a heat engine (see ENGINE), the cycle of operation being completed in a single stroke. Its problem is therefore the general one of *Thermo-Dynamics*. The pressures inside the gun bore were discovered by accurate experiments, and the first were carried out by Robins. Among the advantages of modern explosive charges, as compared with the abandoned black gun-powder, are the evolution of greater volumes of gas at an increased pressure and temperature. The charges are therefore smaller. Cordite is used in artillery and small arms.

PROLETARIAT, lower classes in a state; in Servius Tullius' time *proletarius* was a man valuable only as a begetter of offspring (*proles*).

PROLETARIAT, RULE OF. See BOLSHEVISM.

PROLOGUE, term denoting a preface to a poem or a drama. The original P. in Greek was an integral part of the drama, but it had degenerated into a mere explanatory address to the audience.

PROME (18° 43′ N., 95° 15′ E.), district, Pegu division, Lower Burma. Pop. 375,000. Chief town, Prome, on Irrawadi; trade in rice; silk-weaving industry. Pop. 30,000.

PROMETHEUS (classical myth.), *s.* of Iapetus, a Titan, and Clymene, *bro.* of Atlas and Epimetheus; is represented as helping men against Zeus and teaching the arts; has been called the culture-hero of the Greeks; helped Zeus against the Titans; brought fire to mortals, and as punishment was chained to Mount Caucasus, where an eagle by day devoured his liver, which grew again by night; delivered by Hercules; subject of many legends (see Hesiod's *Works and Days* and Æschylus' *Prometheus Bound*). The Gk. legend of the theft of fire is analogous to many stories in all parts of the world.

PROMOTION, FRAUDULENT. See BLUE SKY LAWS.

PRONG-BUCK (*Antilocapra Americana*), an antelope-like hoofed mammal, found only on the prairies of W. North America, and distinguished from antelopes proper by its horns, with a short branch, which are shed annually.

PRONOUN, in grammar, one of the parts of speech, being a word used instead of a noun, to avoid repetition. A P. is a demonstrative word, indicating an object without naming or describing it. P's are of various kinds, expressing different relations between the object and the context or the speaker. They have played an important part in developing inflections in language.

PROOF-READING is the art of correcting errors of the compositor (and if necessary of the author) in order to make the printed sheet mechanically perfect. To facilitate proof-correcting there is a recognized system of signs, by which all the commoner errors are indicated. Corrections are marked in the margin. Proof-Reading requires wide general knowledge, thorough understanding of typography, and keen vision.

PROPAGANDA, WAR.—As a means of aiding the cause of a belligerent, propaganda in an organized and directive form is of modern growth. It was practiced by the Germans in the Franco-German War, with the effect that opinion in other countries was for the time being, largely misled or confused, and in the World War they employed it in a much more systematic and bold manner. They hoodwinked their own people as to the real character of the war, and their propaganda was not without effect abroad, especially in America. It was based, however, on the assumption of a short war; it was reckless in telling untruths and half-truths; and as the war proceeded its effect gradually diminished. At first the Allied governments made but feeble efforts to counter Ger. propaganda. It was only in the later stages of the struggle that the potency of this novel weapon of warfare was fully realized.

In addition to leaflets containing news of Allied successes, illustrated with shaded maps and diagrams, a 'trench newspaper was prepared in a style which exactly resembled a Ger. publication, with a head of the Kaiser as title decoration. From 250,000 to 500,000 copies of each weekly issue were distributed. Religious pamphlets were also used, one of which expatiated on the text, 'Be sure your sin will find you out.' Besides, numerous leaflets were smuggled into Germany by devious methods. Operations were also undertaken against Bulgaria, and the activities of the Allies were carefully co-ordinated. Undoubtedly the propaganda campaign was instrumental in helping on the Allied victory

PROPAGATION. See Reproductive System. Plants.

PROPERTIUS, SEXTUS (fl. 28-15 B.C.), Rom. poet; *b.* Assisium, Umbria; ed. Rome; joined literary coterie of which Maecenas was patron; became friend of Vergil and Ovid; infatuated by courtesan whom he calls 'Cynthia'; parted by mutual infidelity. P. was greatest master of the elegiac meter; is imaginative, tender, brilliant in flashes, though his work is not consistent; wonderful descriptive power and command of language. Four books of his poems are extant, mostly love-poems interspersed with verses on political and historical themes. Best-known poem described the appearance of Cynthia's ghost to the poet.

PROPERTY, COMMUNITY OF. See Communism.

PROPHET.—The Heb. terms for 'prophet' mean one who speaks from God, with the idea that he is possessed by a supernatural power. At the beginning he was regarded as endowed with the gift of prediction. In the times of Samuel, Elijah, and Elisha, there were 'schools of the prophets,' where the gift could be nurtured and directed; but from the VIII. cent. onwards the prophet received his call and equipment direct from God. 'Literary prophets' were those whose utterances were committed to writing. Like certain of their predecessors, they appeared at critical junctures in the history of their country, and spoke to the people 'of righteousness, temperance, and judgment to come,' as well as of the ultimate triumph of the Divine purpose among the nations.

PROPORTION may be defined as an equality existing between two equal ratios. The ratio between two quantities of the *same kind* is the relation which the one quantity bears to the other, the one being a multiple or part of the other.

PROPORTIONAL REPRESENTATION. See Voting

PROSE. See Literature.

PROSCRIPTION, term applied chiefly in Roman history, to the banishment or condemning of citizens to death as public enemies and confiscating their goods—*e.g.*, the celebrated proscription of Sulla, *c.* 82 B. C., and that by the second triumvirate, 43 B. C.

PROSELYTE, a person converted from one religion to another. The term

is especially used of P's to the Jewish faith, divided into: (1) P's of the gate, and (2) P's of righteousness.

PROSKUROV, a town, of Russia, in the gov. of Podolia, 56 miles N.E. of Kamenets-Podolsk, with active export trade in corn and sugar. Agriculture and market-gardening are the chief industries, but there are also oil works and potteries. Pop. 23,000 (mostly Poles and Jews).

PROSODY (Gk.), the science of versification; that part of the study of language which deals with the forms of metrical composition, including as its three divisions accent, breathing, and quantity.

PROSSNITZ, a town, of Austria, in Moravia, ten and a half miles S.S.W. of Olmütz. There are match-making, brewing, malt, sugar, and geese-breeding industries. Pop. 30,080.

PROSTITUTES.—The difficulty of even a partial solution of the social problem of prostitution seems as far away as ever. The P. is the almost, inevitable concomitant of city life, and apparently the greater the wealth and degree of refinement the greater becomes the evil of prostitution.

PROTAGORAS, (*c.* 480-411 B. C.), a Greek philosopher, *b.* at Abdera. He was especially celebrated for his skill in the rhetorical art, and was the first to call himself a sophist and to teach for pay. He was accused of impiety by Pythodorus in 411, and banished. His most important books were *Truth* and *On the Gods.*

PROTECTION. See TARIFF.

PROTECTIVE COLORATION AND RESEMBLANCE, schemes of coloring or peculiarties of shape which tend to render animals inconspicuous in their natural surroundings, and thus protect them from the observation of their enemies. This aspect of evolution is exceedingly common, and is all but universal among birds and fishes, the paler under parts of the former and silvery bellies of the latter counteracting the effect of the shadow cast by strong overhead light and merging the body as a whole into the monotone of an average background. Or there may be more patent general resemblances to environment, such as the tawny tints assumed by many desert animals; the greens of many arboreal forms, such as tree-frogs, tree-snakes, and parrots; the blue transparencies of pelagic organisms, or the varying coats of Arctic creatures, such as the mountain hare, the Arctic fox, the stoat, the ermine, and the ptarmigan, which change to white when snow covers the ground. Again, more particular resemblances to immediate environment are frequent, most common of these being the color changes which many creatures—*e.g.*, some shrimps, the octopus, plaice, trout, the chameleon, and several other lizards—undergo as they pass from one set of color surroundings to another.

PROTECTOR, Eng. title given to gov. or regent; held by Earl of Pembroke, 1216; Dukes of Gloucester—Humphrey, 1422; Richard, 1483—Duke of Somerset, 1547; Oliver Cromwell, 1653; Richare Cromwell, 1658.

PROTECTORATE, term in international law, for (1) overlordship of a civilized state over a barbarous or semi-barbarous state. These P's are a new international development, being entirely different from the well-known hist. feature of hegemony of one state over its equals. The subordinate states have varying amounts of autonomy, but foreign policy rests with protecting state. (2) Generally, overlordship of one state over another. Interference of other powers with a protected state frequently precipitates annexation. See MANDATE.

PROTEINS.—A class of complex organic substances occurring throughout the vegetable and animal kingdom. They are sometimes known as 'proteids,' 'albumens,' or 'albuminoids,' but the name Protein is now generally adopted for the entire group, while the alternative names are restricted to sub-groups. Their distinguishing characteristic is their nitrogen content, and they form the most important constituent of animal food. Life, without Protein, is impossible, as no other food constituent can repair the daily waste of tissue. Flesh food, eggs, milk, cheese, legumes, and nuts, are all high in Protein. Their chemical nature has been investigated and over 50 varieties have been classified. They are all distinguished by their complex character, and the large size of their molecules. In other respects, they differ widely, some being readily soluble, others insoluble, in all solvents. To what extent they differ in their nutritive properties still remains an open question, some maintaining that Proteins of animal origin are necessary for complete and efficiency, while others claim that vegetable Proteins can supply all the nutrition needed.

PROTEOMYXA, minute animals, parasitic in living organisms, or saprophytic, included in a sub-order of Amoeba, an order of primitive Protozoa.

PROTESILAUS (classical myth.), first Greek to leap ashore at siege of Troy; slain by Hector.

PROTESTANT, name given to Reformed Churches in distinction to the R.C. or ancient Eastern Churches; because Luther and his followers 'protested' against a Catholic decree passed at the Second Diet of Spires, 1529.

PROTESTANTENVEREIN, Ger. association, founded, 1863, to promote unity among Protestants; great object, federation of Prot. churches; exercised some influence on state, but roused opposition of orthodoxy.

PROTESTANT EPISCOPAL CHURCH, the Anglican communion in America, or the American branch of the Church of England. The name was adopted, in 1780, for the existing church, inherited from the English colonial era. Five years later an ecclesiastical constitution was drafted, and only adopted for the union of the Episcopalians in the United States into one organization, affirming freedom of the church from civil control, domestic, or foreign; independence of the church in America from control by the mother church; retention of the doctrines and policy of that church, involving the three orders of the ministry; freedom of the American church to make its own liturgy; and placing the government of the church in the hands of a house of bishops and a house of clerical and lay deputies. The Episcopalian prayer book omitted the Athanasian Creed, and included the Scottish version of the Prayer of Consecration in the Communion Service, but its liturgy is otherwise almost identical with that of the English church. Each local diocese and missionary jurisdiction has its own convention of clergy and lay deputies, with limited legislative powers.

The church made little growth in the early years of the XIX. cent., but acquired a needed stimulus in 1811, with the consecration of Bishop Hobart of New York, and Bishop Channing Moore of Virginia, and from this period sprang the missionary work in the West, to which emigrants poured in thousands for a long period after. The church now has 90 dioceses and missionary districts in the United States, and 11 missionary districts abroad. It controls two schools of arts and sciences, four non-sectarian colleges, 12 theological seminaries, and two schools of arts and theology. Numerous periodicals are published under the church's auspices, including the *Churchman*, and the *Living Church*. In 1922, the number of communicants was 1,118,396, the largest congregations being in the states of New York and Pennsylvania.

PROTEUS (classical myth.), 'the old man of the sea,' tender of Neptune's flocks; a prophet, he hated prophesying and, to escape an inquirer, assumed various forms. When caught he resumed his true form and prophesied.

PROTEUS, a blind, newt-like amphibian, sometimes a foot in length found in limestone water-caves of Carinthia and Dalmatia.

PROTHERO, GEORGE WALTER (1848), British historian; prof. of history, Edinburgh Univ., 1894-9; director of Historial Section, Foreign Office 1918-19; member of the British Peace Delegation, 1919. Works include *Life and Times of Simon de Montfort, 1877*; *Memoir of Henry Bradshaw, 1889*; *Select Statutes and other Documents bearing on Reigns of Elizabeth and James I., 1894*; *German Policy before the War, 1916*; editor of the *Quarterly Review*.

PROTISTA, comprehensive name applied to simplest unicellular forms of life, whether plant or animal.

PROTOCOL (Gk., first, and 'to glue') a sheet glued to the front of a manuscript and bearing an abstract of the contents and purport), the rough draft or original copy of a government despatch, treaty, or other document.

PROTOGENES, a painter of ancient Greece, who flourished *c.* 300 B.C. practiced chiefly at Rhodes.

PROTON. See CHEMISTRY.

PROTOPLASM is the living matter of organic things, plants, or animals. It is contained in cells which, in animals may be naked or bounded by a delicate membrane, and in plants, have strong walls of cellulose. To the naked eye, and under a microscope of moderate magnifying power, P., in its simplest known state cytoplasm, appears to be a homogeneous, transparent, semi-fluid substance but high magnification and the use of suitable staining materials reveal a complicated structure. This appears to differ in different cells and at different times, but in general it is fibrillar—interspersed with minute filaments of dense material; reticular—with a meshwork of delicate threads; granular—with exceedingly minute particles scattered in the substance; or alveolar—with a foam-like structure of liquid containing vacuoles round which the Protoplasm streams.

PROTOZOA (Gk. *protos*, 'first'; *zoon* 'an animal'), the simplest animals; the most primitive of all animals, standing with the simplest plants (*Protophyta*) at the base of the tree of life. They are to be distinguished from other animal

by the simplicity of their structure, for as a rule they consist of a single cell or bead of jelly-like protoplasm; even where many single cells are united into a colony, as in *Volvox*, each cell is similar to its neighbors, and is more or less independent of them—a congregation very different from the tissues of cells which make up the bodies of other animals. So simple, however, is the structure of Protozoa that it is almost impossible to distinguish them from the simplest plants.

Protozoa are found all the world over. Some occur in freshwater pools, many in the sea, and such feed upon bacteria, diatoms, or even upon Protozoa more minute than themselves. Others live upon decaying vegetation, absorbing the organic solutions resulting from the breaking down of tissues, while a few contain colored grains (*chromatophores*, or *chromoplasts*), by the aid of which they can, like plants, utilize sunlight for the decomposition of carbon dioxide into usable substances. But many are parasitic, living in the bodies of larger animals, and even of man, feeding upon the ready prepared substances in which they lie, and so occasionally interfering with the health of their hosts, and sometimes causing death.

Apart from their relation to disease, Protozoa have little apparent economic significance. The Infusorians and Mastigophora, or Flagellates, however, purify waters by their destruction and assimilation of harmful bacteria, while the Foraminifera and Radiolaria of past ages have contributed to the building of great formations of limestone and chert.

PROUDHON, PIERRE JOSEPH (1809-1865), French socialist; *b.* Besancon. He held that the possession of property was unjustifiable and that an individual had a right only to the product of his labor. He founded a school of individualistic or philosophical anarchy, which held that the state represented unintelligent conservatism, or brutal reaction, and that its abolition was needed for the betterment of humanity, which must come from below through the individual, not from the government. He remained for long a leader of French political thought. He started life as a printer's apprentice, in 1828, and later set up an establishment of his own, which failed. His *Essai de de grammaire generale*, published in 1838, secured for him a triennial pension of 1,500 francs from the Academy of Besancon, but this was withdrawn, in 1840, by his publication in Paris of *Qu'est-ce-que la propriete*? In this work he summed up his socialistic doctrines with the dictum, *La propeiete c'est le vol.* Further publication of his views caused his prosecution for holding noxious opinions, but he was acquitted. He was a leading figure in the revolution of 1848, by reason of his extreme democratic and socialistic opinions, which he advocated with vigor, as editor of the *Representant du Peuple*, and as a member of the Constituent Assembly. He was editor of three daily journals, in succession, *Le Peuple*, *La Voix du Peuple*, and *Le Peuple of 1850*, and exercised great influence upon current political movements, frequently running foul of the authorities for his editorial opinions, and penalized by fines, which were met by popular subscription. An attempt to put his theories into practice, in 1849, by the establishment of a people's bank, led to the closing of the institution by the authorities and his imprisonment for three years. Later he removed to Belgium, and returned to Paris after the amnesty of 1860.

PROUTY, CHARLES AZRO (1853-1921), lawyer and U.S. railroad commissioner; *b.* Newport, Vt.; *d.* there. He graduated from Dartmouth College, in 1875, and studied for the bar. He was admitted, in 1882, and practiced his profession in his native town till 1896. Meantime, 1888, he was a member of the Vermont house of representatives, and reported the decisions of that state's Supreme Court. In 1896, he was appointed to the U.S. Interstate Commerce Commission, and served as chairman of that body from 1912 to 1913. In 1918, he became director of public service and accounting for the Railroad Administration, created by the Government in the World War period.

PROVENCE (43° 40′ N., 5° 30′ E.), anc. prov., S.E. corner of France, now forming depts. Bouches-du-Rhône, Var. Basses-Alpes, and E. part of Vaucluse. Earliest inhabitants were Iberians and Ligurians; *c.* 600 B.C., the Gr. colony of Massalia (Marseilles) is said to have been founded; Romans entered Gaul, *c.* 125 B.C., founded *Provincia Romana*, with Aix as cap.; after Caesar's conquest of Gaul, in 50 B.C., Arles became leading town; Provence was attacked by Visigoths and Burgundians, in V. cent., and in VIII. cent., by Arabs from Spain; two cent's later region was overrun by Saracens; country was ruled by counts of Provence; in 1245, it passed into hands of Charles of Anjou, King of Naples, and was joined to France, in 1486, under Charles XIII. District is remarkably rich in Roman and mediaeval remains, finest being at Aix, Arles, Avignon, Nimes, and Orange.

Provencal Language and Literature.—Provencal is the language which was

spoken in France S. of the Loire during earlier Middle Ages. It was called *Langue d'Oc*, and was spoken also in Catalonia, joined to Provence under Raymond Berenger, 1092. The literature of the *Langue d'Oc* was very different from that of the *Langue d'Oil*, because Roman civilization had left a deeper mark, and Ger. and Norman invasions were less felt. Roman learning revived in Toulouse, Bordeaux, Narbonne, and Arles; S. France (the E. part under the counts of Toulouse and the W. under the kings of England) enjoyed for many cents. more peaceful government than N. France; mild climate and frequent intercourse with Moors of Spain contributed to give the *Langue d'Oc* its harmony and color, to which the name of *gaye science* or *gay savoir* is due. Poets of the N. were called *Trouveres*, the Provencal poets *Troubadours* (*robar*, 'to find,' 'invent'). They were often nobles, even kings, sometimes poor vassals. Their chief subjects were love in all its phases, the joys of home, war, and sometimes personal satire; they composed *cansos* (songs), *pastourelles*, *tensos* (poetical dialogues), and *sirventes* (satires). Some troubadours went from castle to castle; they wore many-colored dresses, and carried a guitar or other musical instrument.

None of those poets left masterpieces, therefore the *Langue d'Oc* could not become a literary language. Soon the religious war of the Albigenses broke out; North seized the opportunity to attack South; Raymond, Count of Toulouse, was defeated and all the country sacked; the troubadours disappeared and Provencal poetry ceased. In 1323, Toulouse made an attempt to recall it to life by instituting the *Jeux floraux*.

In the XVII. cent., the *Jeux floraux* formed an academy which exists to this day. It takes its name from flowers distributed to the laureates. This presentation, called *fete des fleurs*, takes place at Toulouse, May 3.

Towards the middle of the XIX. cent., there was a renaissance of Provencal language and poetry, under the association called *Felibriges*, its members being the *Felibres*. The first impulse was given by Jasmine; founded, 1854, by Mistral, 1830-1914, Roumanille, 1818-91, Anselme Mathieu, Théodore Aubanel, 1829-86, and others.

PROVERB (from Lat. *pro.* forth, to the world, and *verbum*, word), a fragment of folk-literature or, as the Greeks phrased it, 'a wayside saying.' Such adages are as old as the hills, and are common to all languages and people; the Spanish have as many as 30,000, whilst Wander actually estimated the German at 145,000. These concise expressions were especially popular in the middle ages and abound in the writings of Cervantes, Rabelais, and Montaigne; its decline in veneration accounts for their rarer use today.

PROVERBS, BOOK OF, in the Old Testament is part of the 'Wisdom' Literature. The word 'Wisdom' is here used specially of a certain sort of intellectual acuteness. The interest of the Wisdom lit. is not so national as that of the 'Prophetic,' and is concerned largely with reflections on human nature. 'Proverb' in Hebrew is *mashal* (also the equivalent of parable), and means 'representative statement.' The book falls into eight divisions, viz.: (1) Chapters 1-9; (2) $10\text{-}22_{16}$; (3) $22_{17}\text{-}24_{22}$; (4) $24_{28\text{-}34}$; (5) 25-29; (6) 30; (7) $31_{1\text{-}9}$; (8) $31_{10\text{-}31}$. All these 'differ in tone and subject'; (2) called the '*Proverbs of Solomon*,' forms the central portion of the book and some, though hardly all, may be by King Solomon. The style of *Proverbs* is distinctive; some words and phrases are not found much elsewhere in the Old Testament. The date of the book is uncertain; (2) is certainly the most ancient but the book as a whole suggests the greatest days of the monarchy.

PROVIDENCE, a city of Rhode Island, the capital of the state, and the county seat of Providence co. It is on the New York, New Haven and Hartford Railroad, and on Providence River an arm of Narragansett Bay. Providence is the second city of New England in population and wealth. It has more than 2,000 manufacturing establishments, employing about 40,000 people. Its most important industry is the manufacture of cotton and woolen goods. It is also among the first in the manufacture of jewelry and stoves. Other industries include the making of silverware, tools, engines, locomotives, boilers, sewing machines, hardware, chemicals, etc. The city has an extensive coastwise commerce, and a large export trade in coal, cotton, and wool. There are steamship lines regularly to Boston, New York, Philadelphia, and Baltimore. The total area of the city is 19 square miles. It has about 270 miles of streets, of which about 75 miles are paved. In the public schools are enrolled about 40,000 pupils. The city is the seat of Brown University, La Salle, and St. Xavier's academies, Rhode Island School of Design, and the Academy of the Sacred Heart. There are also many charitable and philanthropic institutions. The city has about 120 churches, and several beautiful parks, the most important of which is Roger Williams Park. Providence was

founded in 1636, by Roger Williams, who received a gift of land from the Indian chief, Canonicus, after Williams had been exiled from Massachusetts. The city was partly burned in 1675, during King Philip's War. Its area has been increased by the addition of several suburban places. Pop., 1920, 237,595.

PROVINS (48° 33′ N., 3° 17′ E.), town, Seine-et-Marne, France; interesting features are XII. cent. church of St. Quiriace and the Grosse Tour; mineral springs; flour-mills; extensive rose gardens in vicinity. Pop. 7,700.

PROVO, a city of Utah, in Utah co., of which it is the county seat. It is on the Denver and Rio Grande, and the San Pedro, Los Angeles and Salt Lake railroads, and on the Provo River. It is the center of an extensive agricultural, fruit growing and cotton raising region. Its industries include the manufacture of woolen goods, flour, iron, and tin roofing. It is the seat of Brigham Young University, a Mormon tabernacle, and Proctor Academy, and has a public library, and a Federal building. Pop., 1920, 10,303.

PROVOST, ancient title of certain ecclesiastical and secular officers. In France, in the Middle Ages, the P. of Paris was a royal judge.

PRUDENTIUS, MARCUS AURELIUS CLEMENS (*b.* 348 A.D.), Lat. writer; *b.* Spain; wrote sacred verses; called by Bentley 'the Horace and Vergil of the Christians.'

PRUNES. See PLUMS.

PRUNING, removal of branches from fruit trees, so as to improve fruit-supply, or from hedges, etc., for ornamental purposes. *Winter P.* is done in Jan. or Feb., and the spur left must have one or two buds; red currant bears fruit on old branches; black currant and gooseberry on young shoots; raspberry old wood is cut away. Cherry, holly, ivy, may be pruned in summer. When P. fails to make a tree bear fruit, root-pruning may effect a cure; fruit trees should be planted on a stone slab, else roots will grow downwards and thus be beyond reach of P.

PRURITUS, itchiness of the skin, due to various causes, *e.g.*, nervous derangements, jaundice, eczema; improving on treating the cause; in obstinate cases, warm baths, sponging with weak carbolic lotion, and pilocarpine injected hypodermically, are beneficial.

PRUSSIA (50°-55° N., 6°-22° 50′ E.), republic of Ger. Empire; mainly situated in great N. Ger. plain; bounded N. by North Sea, Denmark, and Baltic; W. by Holland, Belgium, Luxemburg, and France; S. by Bavaria, Saxony, and Czecho-Slovakia; E. by Poland. Prussia contains 13 provinces: W. Prussia, E. Prussia (detached) Silesia, Pomerania, Posen, Brandenburg, Saxony, Schleswig-Holstein with Heligoland, Hanover, Westphalia, Rhineland, Hesse-Nassau, Hohenzollern. Large parts of Posen, E. and W. Prussia, have been absorbed into Poland; part of W. Prussia into Free City of Danzig; part of Schleswig has reverted to Denmark; part of Rhineland given to Belgium, Plebiscite areas remain in E. Prussia and Silesia. Seaboard is *c.* 900 m.—750 on Baltic, rest on North Sea. Baltic islands are Rügen, Fehmarn, Usedom, Woolin; Frisian Islands in North Sea.

Surface is generally level, large stretches of moorland (Lüneburger, Heide, in Hanover), sandy plains (Brandenbueg), and marshland along coast. Mountains lie in S. and S.W.; Riesengebirge (with Schneekoppe, 5,255 ft.), in Silesia; Harz Mts (with Brocken, 3,750 ft.), in province of Saxony; Hunsrück, Taunus, Eifel, Westerwald, etc., in Rhineland; and other ranges. The principal rivers are: Rhine, Weser, Elbe, Oder, Havel, Saale, Ems, Pregel; many navigable and linked by canals; Kiel Canal zone is under League of Nations; numerous lakes, especially in Pomerania, W. and E. Prussia; vast lagoons on coast—Kurisches Haff, Frische Haff, and Stettiner Haff. Climate generally healthy; N.E. much exposed and coldest; ann. mean temp. of Berlin, 48° F.; average ann. rainfall is *c.* 21 in. Extensive forests of fir, spruce, larch, beech, birch, oak, etc., especially in Hesse-Nassau, Brandenburg, and Hohenzollern.

Resources and Industries.—The total railway mileage is 24,763; electrification of lines begun. Republic has important agricultural, mining, and manufacturing industries. Principal products are cereals, beet, hemp, flax, potatoes, hops, oil-seed, live stock, timber, etc.; famous wines made in Nassau and Rhineland; valuable horses bred in E. Prussia. Prussia is rich in minerals—coal, iron, zinc, copper, lead, cobalt, arsenic, sulphur, nickel, etc.; important mining centers are Westphalia, Silesia, Rhine Province, Harz, Prussian Saxony, Brandenburg, Nassau. Manufactures include textiles, iron and steel goods, leather, glass, china, earthenware, chemicals, musical instruments, paper, etc.; celebrated Krupp works at Essen; extensive breweries and distilleries; valuable salmon, herring, cod, oyster, etc., fisheries; many mineral springs.

Government.—By the Constitution of

April, 1920, the Prussian Constituent National Assembly is elected for four years by universal vote; ministry, with powers of former king, consists of premier, who is also minister of agriculture, and ministers of interior, justice, public worship, finance, national welfare, railways, and commerce. The principal towns are: Berlin (cap.), Cologne, Breslau, Frankfort-on-Main, Düsseldorf, Hanover, Essen, Madgeburg, Königsberg, Duisburg; Altona, Stettin, Swinemünde, important seaports. Two-thirds of pop. are Prot.; *c.* one-third R.C. Elementary education is compulsory from six to fourteen, and maintained by local taxation and state aid. There are 11 universities, besides five technical high schools, mining agricultural, forestry, art, music, and other schools. Area, *c.* 103,384 sql m. Pop. *c.* 32,300,000.

History.—Prussia was erected into a Prot. duchy, 1525; in 1618, the Elector of Brandenburg (Hohenzollern house), became the Duke of Prussia. Frederick William, 1640-88, the Great Elector, obtained at the Peace of Westphalia the secularized bishoprics, Minden, Kammin, Madgeburg, Halberstadt, and secured Prussian sovereignty by Swedish-Polish War, 1655-60. During his reign Prussia became a well-organized state and important military power. His successor, Frederick III., 1688-1713, assumed the title of king, 1701, as Frederick I. Frederick William I., 1713-40, was a careful and thrifty monarch; he obtained Guelders and Limburg at Peace of Utrecht, and Swed. Pomerania and Stettin, 1720. Frederidk II., the Great, 1740-86, increased his possessions enormously, annexing greater part of Silesia (without Danzig and Thoen), 1740-2; E. Friesland, 1744; received W. Prussia and Netze dist. at the first partition of Poland, 1772. His successor, Frederick William II., 1786-97, lost many valuable possessions on Rhine, but gained Slavonic territory at second and third partitions of Poland, 1793, 1795. During the reign of Frederick William III., 1797-1840, took place disasters of Jena and Auerstädt, and Napoleon entered Berlin, 1806. Prussia lost most of her territory W. of the Elbe, and the greater part of Prussian Poland, 1807.

Then began a great national revival, and Prussia shared largely in Napoleon's overthrow at Waterloo, 1814. At Congress of Vienna, 1815, she regained most of her old possessions W. of Elbe, and part of Saxony, Rügen, Swed. Pomerania, etc. In Frederick William IV.'s reign, 1840-61, took place abortive revolution of 1848. Under William I., 1861-88, Bismarck became prime minister, 1862. For Prussia's part in the World War, see WORLD WAR. Prussia was proclaimed a republic on Nov. 3, 1918.

PRUSSIAN BLUE, $Fe_4(FeCN)_3$, a dark-blue solid which is precipitated by the addition of potassium ferrocyanide to a solution of a ferric salt. It is insoluble in water and dilute acids, but is acted on by alkalies. Commercially it is prepared by oxidizing a mixture of ferrous sulphate and yellow prussiate of potash. As a dye it has been superseded by aniline products.

PRUSSIC ACID (HCN), was first obtained by Scheele, in 1782, from the substance known as Prussian Blue. It is formed in the decomposition of the glucoside anygdalin, which is present in almonds, and other plants. A solution of the acid is best prepared by distilling potassium ferrocyanide with dilute sulphuric acid. The anhydrous acid may be prepared by the action of sulphuric acid on potassium cyanide, or by depydrating an aqueous solution of the acid with calcium chloride. When pure H.A. is a light colorless liquid, freezing at –15° C., and boiling at 26° C., having the odor of bitter almonds. It is extremely poisonous, a single drop taken internally causing instantaneous death due to paralysis of the heart.

PRUTH, a river, of S.E. Europe, and trib. of the Danube, flows for 360 miles between Roumania and Bessarabia from the Carpathian Mts. It joins the Danube on the left at Reni. Total length, 500 miles. Drainage area 10,700 sq. miles.

PRYNNE, WILLIAM (1600-69), Eng Parliamentarian; barrister of Lincoln's Inn, but never practised; wrote numerous anti-episcopal pamphlets, and, in 1632, *Histrio-mastix, or a Scourge for Stage Players*, a violent Puritan invective without any literary quality; punished by Star Chamber with fine, loss of both ears, and perpetual imprisonment issued another pamphlet from Tower and was further fined, mutilated, and branded on cheeks with 'S.L.' (Seditious Libeller); released by order of House of Commons, 1641; returned to Parliament for Newport, Cornwall; imprisoned for attacks on Cromwell; worked for Restoration; ultimately Keeper of Records in Tower; and issued valuable calendars.

PRYTANEUM, place in Gk. community where sacred fire was kept alight; it was used as town hall on state occasions.

PRYTANIS (Gk. 'chief').—(1) Gk magistrate; (2) member of Athenian Council of Five Hundred.

PRZASNYSZ (53° 0′ N., 20° 30′ E.) vil., Poland, 27 miles N. of Pultusk

center of roads to Mlawa, Czechanov, Pultusk Ostrolenka, Willenberg, etc. Captured by Germans, but recovered by Russian counter-attack, Dec., 1914; changed hands several times during the war.

PRZEMYSL (49° 47′ N., 22° 47′ E.), town, Galicia, Poland, on river San, 56 miles W. of Lemberg; seat of R.C. and Gr. bishoprics; two cathedrals; wood, leather, corn, and linen. Before the World War the strongest fortress in Galicia; strategically important as railway node on main trunk line connecting Lemberg with Cracow and giving railway access to the Lupkow and Uzsok passes. Russians invested it, Sept. 27, 1914; forced to retire beyond the San; reinforced by Austrians, Oct.; again besieged by Russians, Nov., 1914; after attempts to relieve it, surrendered to Russians, March 22, 1915, with 120,000 prisoners and 1,000 guns. Recaptured by Mackensen after a break-through on the Donajetz, June 2, 1915. Given to Poland with Galicia by Treaty of Versailles. Pop. 54,000 (mostly Poles and Jews).

PRZHEVALSK (42° 30′ N., 78° 30′ E.), town, Semiryechensk, Russian Turkestan. Pop. 8,000.

PSALMANAZAR, GEORGE (*c.* 1680-1763), Fr. imposter; after much traveling, came to London, 1703; trans. Church Catechism into 'Formosan,' and wrote a *Hist. and Geographical Description of Formosa*, a work full of absurd imagining; lionized for a time, then, losing popularity, became tutor, clerk, fan-painter, hack journalist; Dr. Johnson admired and believed in him.

PSALMS, BOOK OF, in the Hebrew Bible begins the Hagiographa or Sacred Writings, forming the third part of the Hebrew Scriptures (the others being the Law and the Prophets). In Hebrew it is called *Tehillim, i.e.*, 'Songs of Praise.' Many Psalms are traditionally ascribed to King David, and others to his chief singers, to Solomon, etc. But the majority are doubtless of later date, both as regards language and reference. In Hebrew the *Psalms* are divided into five books, containing respectively Psalms 1-41, 42-72, 73-89, 90-106, 107-150; but scholars consider the real division to be threefold, Books 2 and 3 being taken together, also 4 and 5. The middle group thus formed, 42-89, is distinguished by the use of the term *Elohim*, which seems to be a consistent alteration from the original Jehovah in the text. The LXX. version of the Psalms is fairly literal. From it were derived (1) the Old Latin, the basis of the *Psalterium Romanum*; (2) *Psalterium Gallicanum*, which appears in the Vulgate. The *Psalter* has played a prominent part in Christian worship.

PSALTERIUM, a division of the ruminant stomach. See under PECORA.

PSALTERY, a musical instrument akin to the dulcimer, used in ancient times, and very popular during the middle ages. It was played with the fingers or a plectrum. It is usually used in the Bible to translate the Heb. *nebel*.

PSEUDONYM, a pen-name; well-known P's are Mark Twain (S.L.Clemens),), Max O'Rell (Paul Blouet), George Eliot (Marian Evans), Lewis Carroll (Rev. C.L. Dodgson), Max Adeler (Charles Heber Clark), O. Henry (Porter, Sidney William).

PSUEDOPOD (Gk. *psuedos*, falsehood; *pous, podos*, a foot), an animal with pseudopodia, *i.e.*, belonging to the Sarcodina class of the Protozoa. Pseudopodia (derivation, see *pseudopod*), blunt, mobile extension of protoplasm which proceed from the body and play a great part in the life-activities of the simplest Protozoa.

PSKOV (57° 51′ N., 28° 26′ E.), government, Russia, between Livonia and Smolensk; surface flat in N., hilly in S.; many lakes and marshes; largely forest-covered; unfertile; fisheries, flax industries, distilleries, tanneries. Pop. 1,350,000.

PSKOV (57° 51′ N., 28° 26′ E.), town, Pskov government, Russia, on Velikaya; abp.'s see; tanneries. P. was a member of the Hanseatic League; annexed by Moscow, in 1510. Pop, 34.000

PSORIASIS, skin disease characterized by development of patches of dry, silvery scales on a red base, tips of elbows and lower part of knees being most commonly affected; treatment is in acute cases, sodium salicylate or antimony wine; in chronic cases, arsenic, with local treatment of alkaline baths, removal of the scales by scrubbing, and application of chrysarobin ointment.

PSOROSPERMIASIS, rare disease caused by animal parasites, psorosperms, found in the liver, kidneys and ureters.

PSYCHE (classical myth.), royal maid whose beauty aroused Venus's jealously. Venus sent Cupid to inspire her with love for the meanest of men, but he fell in love with her. He warned her not to inquire who he was; she disobeyed, and Cupid deserted her. They were finally united in Elysium.

PSYCHIATRY is a term which designates the study of the subject of mental

diseases in all its departments—causation, classification, symptomatology, treatment. During the last thirty years an enormous amount of work has been done in this branch of med., and to-day all medical students receive special instruction in the subject. Special diplomas in psychiatry are granted by the principal teaching bodies. Efforts are constantly being made for the insane by giving special training to the medical officers, increasing their opportunities for research, and adding to their numbers; but such efforts in the majority of cases meet with apathy on the part of governing bodies and government officials. Of late years the most important scientific results have been contributed by continental alienists, notably by Sigmund Freud of Vienna and Emil Kraepelin of Munich. Certain schools of psychiatry in the U. S. have a high reputation, and Italy has contributed largely to our systematic knowledge of the subject.

PSYCHICAL RESEARCH is a recent development of scientific or (as some would say) of pseudo-scientific thought. It is concerned with all those phenomena —thought-transference (or telepathy), hypnotism, clairvoyance, crystal-gazing, poltergeists, apparitions, etc.—which are not ordinarily explicable and the occurrence of which is often set down to fancy or superstition. The London Society for Physical Research was founded in 1882 and similar organizations exist in America and elsewhere. Its object was to investigate these phenomena without pre-suppositions of any kind. It has examined a large mass f evidence, and telepathy at least seems to have been proved. 'Ghosts'—*e.g.*, haunted houses—and automatic writing are psychic phenomena much studied. The receipt of messages by mediums from another world is still open to doubt.

PSYCHO-ANALYSIS has come to mean the process by which an investigator is able to discover the mental content of a person. The process is usually applied in order to remove mental trouble that has arisen because of certain combinations of ideas that have been suppressed, and have exercised a deleterious influence in the 'unconsciousness.' Psycho-analysis is usually associated with the name of Prof. Freud of Vienna Univ., and his theory (Freudism) regards human life as a struggle between two principles—the pleasure principle and the reality principle. In life we find it necessary to suppress a great many desires because we have no means of gratifying them. These are driven out of our consciousness, with the result that they gather below the threshold, forming 'complexes' in the unconscious, and often influencing our conduct without our being aware of the origin of the influence. Psycho-analysis is the study of the content of this unconsciousness in ourselves or others.

It is very difficult to get at the content of unconsciousness, because an endeavor is always made to prevent the complexes from coming into consciousness, where they may be examined. During sleep the resistance is much less vigorous than during waking hours, and Freud holds that by careful analysis and interpretation of dreams we may get at this content. Skilled psycho-analysts claim that they are able to discover from an honest complexes that thus express themselves in a more or less symbolic way. Apart from dreams, there is the method of psycho-analysis that consists in getting the patient to become quite at his ease in the presence of the investigator, and to allow his mind to wander in reverie, following up whatever ideas occur without exercising any control over them. In this way the analyst is able to gather a great deal without the patient being at the time, aware of the information he is communicating.

In the field of criminology more and more attention is now being directed to the subject, and psycho-analysis is proving an important means of investigation.

See AUTO-SUGGESTION.

PSYCHOLOGY means by derivation the 'theory of soul.' But the term is not now usually so defined, and is indeed rather ambiguous. Most commonly by psychology is meant an empirical study scientific—or at any rate on the way to become scientific—in method, of actual mental activities and states. It treats we may say, of the behavior of minds or of the behavior of living things.so far as that behavior depends on their exercise of mental activity in any degree. An an empirical study, it deals with mental behavior as we find it actually occurring in ourselves and believe it actually to occur in others; as a positive study, it does not inquire into the validity of such distinctions as good and bad, true and false, but concerns itself equally with all manner of conduct, considering any act or state not as having logical or moral value, but simply as an event in time whose conditions and consequences need to be assigned; and, finally, as a scientific study, it tries to start from accurate observation and analysis and to arrive at well-established general principles of mental behavior.

The whole subject may be divided into departments in a variety of ways. For instance, we may distinguish the investigation of the human from that of the

animal mind; abnormal from normal human behavior; within the latter, study of childhood or of adolescence from that of adult life; again, the study of individual differences, and the study of the behavior of masses of men and of the characteristics of peoples (*Social Psychology* and *Folk Psychology*.) As a rule, when the word psychology is used without any qualification, it refers to the study of the normal human being. Again, attention may be given mainly to the analysis, description, and explanation of a particular stage of mental behavior, or to the development of mental behavior; in the latter case we speak of *Genetic Psychology*. *Physiological Psychology* studies the connection between mental and bodily processes.

The psychologist must start, of course, with investigation of the normal adult mind, for until he has learned to reflect on his own activities and states he cannot consider those of other beings with profit. This process of reflection is technically called *Introspection*, a somewhat misleading name. It is fundamental in psychology, but it needs to be supplemented, first by the reports of others concerning the results of their reflection; secondly, by observation of the conduct of others and inference therefrom to the mental process which occasioned and are occasioned by that conduct; and, thirdly, by examination of such products of mental activity as tools, works of art, and institutions, from which also we may be able to argue to the character of the activities that produced them. In recent years the use of experiment in psychology has been much extended, so that some speak of it as a special branch of the subject; but it is rather an application, requiring special knowledge and skill, of any of the above methods, or of them all in combination, under conditions which admit of accurate statement and produce more or less accurately measurable results.

In more resent years pyschologists have generally recognized that mental behavior is predominantly purposive, not in the sense, of course, that it always makes to the fulfilment of ends consciously forethought and designed—for that would obviously be false of the behavior of the lower animals and of small children, and indeed of much adult behavior also—but in the sense that it does nevertheless make towards ends the gradual attainment of which gives satisfaction, whilst obstruction and failure occasion annoyance, anger, or some kind of dissatisfied feeling. The recognition of this truth has been a great step in advance. On the other hand, it cannot be said that general agreement has been reached in the solution of the first analytical problem of psychology, which is usually stated as: What are the ultimate modes of being conscious, or the ultimate functions or faculties of mind? The commonest view is that we must, in the first place, distinguish three attitudes of the mind towards its objects: it is aware of or apprehends them (*Cognition*), is affected by them (*Feeling or Affection*), and strives to bring about some alteration in them or in their relation to itself (*Conation*). It is usually added that most, if not all, concrete mental behavior includes these three attitudes at once. On the other hand, some have argued that feeling and conation are so closely inbound with one another that they should not be called distinct functions; others, with more plausibility, that cognition is not an activity distinct from conation, but every awareness of objects is the issue of an impulse or volition, or generally of some conative process.

If we survey the development of mental behavior to the human stage from lower levels, it seems at first to have involved the acquisition of totally new powers (*e.g.*, of judging, reasoning, willing); and in the small child also capacities seem after a time to appear which were not manifest before. But in observing the child's growth we are never really able to say, 'This is the moment at which a totally new power has first been exercised,' so gradual is the development; and perhaps, as has already been suggested, we ought throughout to think rather of a development of capacities out of more rudimentary forms in which we observers fail to recognize their existence. However that may be, it does not seem that in the history of the human race totally new powers have been developed, though many have been enormously heightened. Apart from the origination of new capacities, mental development presents two main features —increasing breadth and increasing organization of interest. The growth of intellect in not only acquisition of new information, but also the systematization of thought in such a way that what has been acquired can be effectively utilized, whether for practical or for theoretical purposes. The growth of feeling is exhibited in the formation of sentiments or complex emotional dispositions towards objects. Lastly, on the conative side there can be traced a similar and closely connected growth and organization of desires and purposes.

The main result of the study of *animal behavior* has been to throw light on the importance of congenital instinctive dispositions as the basis of mental development. These dispositions and their modifications in response to varying circum-

stances are more easily observed in the lower animals than in human society, where they are almost from the outset altered by imitation and tradition and social influences generally.

The study of *abnormal* and *diseased state of minds* has given psychology more problems than it has solved. The interpretation of these 'natural experiments' is usually very difficult, largely owing to the unreliability of patients' statements about themselves, which is specially marked in cases of hysteria. One result of this study has been to emphasize very strongly the influence of emotions and moods on thought and action. This has been brought out, for example, by cases of *alternating personality*, in which patients seem to lead two (or more) alternate lives, with different temperament and character and interests. As a rule, they do not remember their abnormal life in their normal periods, and often they also forget events of their normal in their abnormal conditions, though they either retain, or at any rate very rapidly regain, many dexterities, the power of speech, ability to recognize common things, and the like. It seems fairly well ascertained that in a great number of these case the change of interest and memory rests on an extreme alteration of mood.

Obsessions or *Insistent Ideas* are also abnormalities which seem frequently to arise from exaggerated emotional conditions—*e.g.*, from extreme anxiety. When, as is frequently the case, they are ideas of action, they are interesting examples of impulsive tendencies, not, like instinctive behavior, prompted mainly by perception, but guided by thought and yet not voluntary. Thus a person may be impelled by the idea of killing another against whom he has no grudge, though all the time he does not wish to do so, and is tortured by the belief that he is going to commit the crime.

Closely related to certain parts of abnormal psychology is the study of *hypnotic phenomena*. This is a very promising field of research, but at present the interpretation of the facts and even the exact statement of the facts to be interpreted, are very much disputed. See INTELLIGENCE TESTS.

PSYCHOLOGY, ANIMAL. See ANIMAL PSYCHOLOGY.

PSYCHOLOGY, CHILD. See CHILD PSYCHOLOGY.

PSYCHOLOGY, COMPARATIVE. See ANIMAL PSYCHOLOGY.

PSYCHO-NEUROSIS.—Mental conditions on the borderline between the normal and the abnormal which occur in mild forms of diseases of the mind. They take the form of fixed ideas or obsessions, which the sufferer finds himself unable to control. He feels compelled to various acts which he recognizes as foolish or even objectionable but which he cannot prevent himself from performing. The condition manifests itself in many strange and apparently trivial ways. For instance, the victim in walking along a pavement may find himself taking great care not to step on the cracks between the bricks, or on the contrary, he may step on every crack, or every alternate crack. Or he goes out or his way to touch every tree or lamp-post or telegraph pole that he passes. He may be haunted by disagreeable thoughts, or certain numbers or phrases may constantly recur to his mind, or he may hum or whistle some tune over and over again. He may continually imagine the sudden death of some friend or relative or be haunted by a nameless fear or anxiety or depression. Sometimes these conditions of mind take the form of phobias—fear of enclosed places, such as tunnels, trains, underground rooms, fear of darkness, fear of high or open spaces. Or they may manifest themselves as manias—kleptomania, the desire to steal for the sake of stealing and without any craving for the article stolen, pyromania—the craving for fire, and so on. These manifestations have been subjected to searching investigation and analysis and have been shown to have their origin in instinctive and probably unconscious desires which demand satisfaction in forms of conduct which are inacceptable, or taboo, and therefore seek expression in devious ways by attaching themselves to apparently trivial activities. The state of mind can usually be cured, much success along these lines being claimed by psycho-analysts, who seek to effect a cure by uncovering the hidden origin of the trouble.

PSYCHOPHYSICS, the study of the relations between physical stimuli and sensations, especially in respect of intensity.

PTAH. See EGYPT (HISTORY).

PTARMIGAN (*Lagopus mustus*), a member of the Grouse family, with the interesting habit of changing its brown coat to white in winter, is found on the mountains of Scotland and of Europe generally.

PTERIA, town, in ancient Cappadocia; was massively built and strongly fortified. Here Croesus was said to have been defeated by Cyrus (*Herodotus*, 1. 76); ruins at Boghaz-Keui.

PTERIDOPHYTA, OR VASCULAR CRYPTOGAMS, the most highly developed group of flowerless plants, including all the existing ferns, horsetails, and club-mosses, as well as a large number of extinct forms. They exhibit a characteristic alternation of generations, the sexual, termed the gametophyte or prothallus, bearing male and female organs, the antheridia and archegonia respectively, and the asexual, termed the sporophyte, arising from the fertilized egg, and in its turn producing asexual spores. These reproduce the sexual generation again, thus completing the cycle. The prothallus is always minute and insignificant, and may, as in the ferns, resemble a small thalloid liver-wort, or be an underground, tuberous structure, as in *Lycopodium*. The antheridia are usually globular structures producing numerous motile sperms, and require the presence of water for their further function as fertilizing agents.

PTEROBRANCHIA, an order of *Hemichordata* or *Enteropneusta*, containing the genera *Cephalodiscus* and *Rhabdopleura*. These are small marine animals associated in colonies and protected by an external gelatinous or chitinous skeleton composed of tubes.

PTERODACTYLS, extint Reptiles.

PTOLEMAIS, ancient name for Acre.

PTOLEMIES, Macedonian rulers of Egypt (323-30 B.C.). Ptolemy I. Soter, became saprap of Egypt on division of kingdoms of Alexander the Great, 323; assumed title of king, 306; serious soldier and historian; abdicated, 285. His *s.*, Ptolemy II., Philadelphus, developed resources of Egypt; court was one of most classically magnificent and vicious of history.

Rome claimed Egypt by bequest of Ptolemy X., Alexander II., but agreed 51, to joint-rule of Ptolemy XII. and his *sister*, Cleopatra, whom, after Egyptian custom, he was to marry; Ptolemy XII. *d.* 44; Cleopatra and her *s.* Caesarion (purative child of Caesar) perished during Rom. attack, 30; Cleopatra's *dau.* by Mark Antony left *s.*, Ptolemy, who *d.* childless, 40 A.D. Egyptian blood, religion, and culture survived throughout this period, though there was heavy foreign infusion.

PTOLEMY, CLAUDIUS TOLEMÆUS, famous astronomer, geographer, and mathematician, was a native of Egypt, and worked at Alexandria, his first extant astronomical observation being in 127 A.D., his last in 151 A.D. His descent, place and date of birth, date of death are uncertain.

As an astronomer he is celebrated as the author of the *Megale Syntaxis*, more commonly known as the *Almagest* (after the title of the Arabic translation to the order of Caliph Al-Mamun, at Bagdad, *c.* 827 A.D.), a summary of his own and his predecessor's work. This is the main authority for the labors of Hipparchus and Eratosthenes. The *Ptolemaic system*, herein set forth, assumes the earth—a sphere, and stationary on its axis—at the center of the heavens, with the planets, including the sun and the sphere of the fixed stars, revolving round it. To explain the apparent motion of these bodies, P., following Apollonius, used a system of eccentrics or epicycles and deferents. The former theory was held till the publication of Copernicus's work; eccentrics were rejected by Kepler (*q.v.*). The *Almagest* contains also Ptolemy's important discovery of the moon's 'evection' and a catalogue of 1022 stars.

PTOMAINE, organic base or alkaloid formed by the action of putrefactive bacteria on organic matter; some of them are poisonous, and to them is due the poisonous action of putrefying sausages, tinned meats, etc.

PUBERTY, the period of life at which persons begin to be capable of begetting or bearing children; in temperate climates, the age of fourteen in males, and twelve in females.

PUBLIC HEALTH, LAW OF, requires that the State, either national or local authorities, shall prevent the pollution of rivers; define the proper construction of buildings—with a due regard to sewage and scavenging; ensure an adequate water supply; insist upon cleanliness in dairies, and bakehouses where food is prepared; and limit as far as possible the area of infectious disease.

PUBLIC HEALTH SERVICE.—Organized by Act of Congress, July 16, 1798. A bureau of the United States Treasury Department, formerly Marine Hospital Service. The service provides and maintains marine hospitals and relief stations for sick and disabled seamen Merchant Marine; supervises national and local quarantine stations, investigates sanitary problems, examines immigrants and excludes physical undesirables; suppresses epidemics and collects and circulates publication of health statistics. It supports marine hospitals on the Atlantic and Pacific seaboards, Gulf of Mexico, Great Lakes, the large river cities, and in Alaska, also relief stations in the United States insular possessions.

PUBLICITY. See ADVERTISING.

PUBLIC LANDS. See DOMAIN, PUBLIC.

PUBLIC LANDS COMMISSION. See CONSERVATION.

PUBLIC SCHOOLS. See EDUCATION, HIGH SCHOOLS, UNIVERSITIES AND COLLEGES.

PUBLIC SERVICE. See CIVIL SERVICE, AMERICAN.

PUBLIC UTILITIES, REGULATION OF.—A right of a government, whether Federal, State or Municipal, to interfere in the administration of certain kinds of private business. There has been much discussion over the enterprises to be included, but according to the decisions of the courts the term Public Utilities has come to include only such enterprises as are based on special privileges, granted by the community, such as a street railway franchise; or are monopolistic in nature, such as gas or water supply; or those forms of public service which vitally involve the public health, as the supply of milk. This principle has only gradually been recognized, the old theory being that no interference with private business was permissible, so long as the general laws were complied with. Regulation usually is based on three demands: equality of rates for equal service; equality of service for equal pay; and the requirements of the public safety and convenience. The first of these finds its best illustration in the Interstate Commerce Commission, which was established as a result of the agitation among the farmers, as expressed through the Patrons of Husbandry, against the practice of the railroads of granting rebates to certain favored shippers. But even as far back as 1876 the courts of Illinois established the right of interference in the regulation of rates in regard to grain elevators, which were even then being used as instruments for depressing prices to the producers. In practically all states there is regulation of transportation. In some states regulation even extends to the capitalization of the corporations concerned, to prevent the watering of stock. The instrument of regulation, at one time the legislature itself, has since shaped itself in the form of a non-partisan commission.

PUBLICANI, Rom. tax-gatherers in the provinces. As the monopoly was frequently granted to the highest bidder, the publican practiced cruel extortion to secure personal profit. Hence the hatred they inspired among the Jews in New Testament times and the opprobrium of 'publicans and sinners.'

PUBLISHING, producing books or periodicals and issuing them for the market. Originally authors were to a great extent publishers and booksellers as well. Next change saw publishing book sellers contracting with authors and printers. Today the division of labor usually is author, publisher (doing his own printing or contracting out), and bookseller. Periodicals of all kinds are usually written, printed, and published by the same firm, and put on market by a distributing agency. Bookselling has divided itself into wholesale and retail, of which former mainly deal with publishers. The beginning of last cent. saw this separation of production and distribution completed, and subdivision has since gone on the lines of specialism.

PUCCINI, GIACOMO (1858), Italian operatic composer; *b.* Lucca; educated under Ponchielli at Milan Conservatorio di Musica. Chief works: *Le Villi, 1884*; *Edgar, 1889*; *Manon Lescaut, 1893*; *La Boheme, 1896*; *La Tosca, 1900*; *Madam Butterfly, 1904*; *La Fanciulla del West 1910*; *La Rondine, 1916*; *Il Tabarro, Suor Angelica, Gianni Schicchi, 1818.*

PUCK, ROBIN GOODFELLOW, fairy who plays jokes; figures in Shakespeare's *A Midsummer Night's Dream*, Johnson's *Masque of Love Restored*, Drayton's *Nymphidia*, Burton's *Anatomy of Melancholy*, Kipling's *Puck of Pook's Hill.*

PUDSEY (53° 47′ N.; 1° 39′ W.), town, Yorkshire, England; woolen manufactures. Pop., 1921, 14,315.

PUDUKOTTAI (10° 23′ N.; 78° 52 E.), native state, Madras, India. Pop 385,000. Capital, Pudukottai. Pop 21,000.

PUEBLA.—(1) (18° 30′ N., 98° W.) state, Mexico, on S. part of Anahua plateau; contains Popopcatepetl. Pop 1,120,000. (2) (18° 59′ N., 98° 2′ W.) capital of above; bp.'s see; cathedral coll.; cottons and woolens. Pop. 96,000

PUEBLO, a city of Colorado, in Pueblo co., of which it is the county seat. It is on the Atchison, Topeka and Santa Fe, the Missouri Pacific, the Chicago Rock Island and Pacific, and other railroads, and on the Arkansas River. It has large iron and steel plants and stock yards. The city is the seat of the State Hospital for the Insane. It has an extensive park system, public libraries, county court houses, and a State Mineral Palace and park. Pop., 1920, 42,908.

PUEBLOS, or PUEBLO INDIANS, are American aborigines who, unlike the roving Indians of the plains, settle in pueblos (Spanish villages or towns), or in agricultural communities. They com

prise a numerous group of varied linguistic stocks and include the Mosqui or Hopi tribes dwelling in the stone and adobe pueblos of New Mexico and Arizona, and the Mexicanized clans living below El Paso, Texas, on the Rio Grande, and in Chihuahua. They are skilled in basket and pottery work, wood carving and weaving, and are supposed to have originated the Navajo blankets.

PUENTE GENIL (37° 25′ N., 4° 45′ W.), town, on Genil, Cordova, Spain; olive oil. Pop. 13,200.

PUENTEAREAS (42° 10′ N., 8° 32′ W.), town, Pontevedra, Spain. Pop. 13,700.

PUERPERAL FEVER, term formerly applied to an acute disease affecting women at the lying-in period, now known to be a septicaemia due to septic infection by various organisms, and prevented by antiseptic methods; it now rarely occurs in midwifery practice.

PUERTO CABELLO (10° 23′ N., 67° 52′ W.), seaport, Carabobo, Venezuela, on Caribbean Sea; exports coffee. Pop. 10,300.

PUERTO CORTES (15° 49′ N., 88° W.), seaport, Honduras, on Gulf of Honduras. Pop. 2,500.

PUERTO DE SANTA MARIA (36° 37′ N., 6° 20′ W.), seaport, Cadiz, Spain, on Bay of Cadiz; exports sherry. Pop. 20.900.

PUERTO PRINCIPE, officially **CAMAGÜEY** (21° 23′ N., 77° 56′ W.), inland city, Cuba; chief produce cigars, woods, sugar. Pop. 30,000.

PUERTO REAL (36° 30′ N., 6° 10′ W.), seaport, Cadiz, Spain, on Bay of Cadiz; ancient Portus Gaditanus; salt mines. Pop. 10,700.

PUERTO RICO. See PORTO RICO.

PUFENDORF, SAMUEL (1632-94), Ger. historian of institutions; followed Hobbes and Descartes; pub. *Elementa jurisprudentiae universalis, 1661*; received as reward chair of Law of Nature and Nations at Heidelberg; treatise *De statu imperii germanici, 1667*, got him into trouble; retired to Sweden and wrote chief work, *De jure naturae et gentium, 1672*; historiographer of Elector of Brandenburg, 1686-94.

PUFF-BIRDS (*Bucconidae*), a family of about 50 species of Picarian birds, found in Central and S. American forests; arboreal and insectivorous.

PUGACHEV, EMEL'YAN IVANOVITCH (*c.* 1741-75), Russ. pretender; claimed to be Peter III., 1773; supported by enemies of Catherine II.; towns sacked and imperial army defeated; captured after bloody battle, 1774; executed.

PUG-DOGS. See DOG FAMILY.

PUGET SOUND, an inlet of the Pacific Ocean, in Washington, U.S.A., extending from the E. end of the strait of Fuca, in a direct line of about 80 m. It has an area of about 2,000 sq. m., and a number of islands, Vashon and Bainbridge being the largest. The two main branches are Admiralty Inlet and Hood Canal. The shores are well wooded, and the fir is shipped to foreign ports for use in shipbuilding. The Sound is also remarkable for its fish.

PUGILISM. See BOXING.

PUKET (7° 55′ N., 98° 25′ E.), town, island of Junk Ceylon (Salang), belonging to Siam; tin mines. Pop. 33,000.

PULASKI, CASIMIR (1748-79), a Polish Count; was *b.* in Lithuania. Being outlawed at the partition of Poland, 1772, he went to America, and in 1776, organized 'Pulaski's legion,' with which he fought against the English. He was mortally wounded at the siege of Savannah, 1779.

PULEX. See FLEAS.

PULICAT (13° 25′ N., 80° 21′ E.), town, Chingleput, Madras, India. Pop. 5,700.

PULITZER, JOSEPH (1847-1911), newspaper publisher; *b.* Budapest, Hungary; *d.* Charleston, S.C. In his youth he drifted to Paris and London, and finally to the United States, in 1864, taking part in the final stages of the Civil War in a cavalry regiment. After the war he joined the St. Louis *Westliche Post*, a leading German newspaper, edited by Carl Schurz, rising from reporter to managing editor and part proprietor. He qualified for admission to the bar, became active in politics, serving in the Missouri legislature, from 1869 to 1870, and later represented the *New York Sun* as Washington correspondent. In 1878, he acquired the St. *St. Louis Dispatch*. He bought the *New York World*, in 1883, and developed it to a leading place in popular journalism. He endowed a school of journalism at Columbia University, founded a Pulitzer scholarship fund, and bequeathed $500,000 each to the Metropolitan Museum of Art and the Philharmonic Society of New York.

PULKOVO, PULKOWA (59° 46′ N., 30° 20′ E.), village, St. Petersburg, Russia; noted observatory.

PULLEY, a wheel rotating on an axle. A groove is cut in the circumference and a rope passed over it. The wheel is called the cheave and the rope the tackle. A P. may be fixed or movable. Fixed P.'s are those in which the axle is fixed to some stationary spot. Movable P.'s are those in which the extremes of the axle are supported on a block of wood.

PULLMAN, GEORGE MORTIMER (1831-1897), railroad coach builder and originator of the Pullman cars; *b.* Brocton, N. Y.; *d.* Chicago, Ill. After a public school education he became a cabinet maker, and devised plans for making long railroad journeys less irksome by providing sleeping cars. The first of these cars was built in 1864, an the Chicago and Alton Railroad shops at a cost of $18,000, and used to carry the body of President Lincoln to burial. Later he headed the company formed to produce such cars for railroads, founded the model town of Pullman, now in Chicago, where the car-manufacturing plant is located, and organized the first vestibule train.

PULMOTOR. A device for inducing artificial respiration in persons overcome by poisonous and noxious gases, those apparently drowned, or in general where respiration has ceased, but slight heart action exists. The machine is operated by the pressure of oxygen supplied to it from a storage tank. Its action is to force air, rich in oxygen, into the lungs until normal lung pressure is reached; the mechanism then reverses its action, drawing out the vitiated air, thus making room for a fresh supply. This operation is carried out automatically and rythmically and is continued until breathing starts. The device is portable and can readily be operated by anyone following the directions given. A metallic mask fits over the patient's face, and is connected by flexible tubes to the automatically operated bellows, which with a control mechanism, valves, etc., and an oxygen tank are mounted in a case. The oxygen is under very high pressure (2,200 lbs. per sq. in.), so as to have a large supply available without using too bulky a container. This pressure is reduced by reducing valves and the mechanism of the device before going to the mask. Invented by Bernard Draeger, it was used for mine rescue work, first in Europe and later in the U.S. Its success has led to its wide use by hospitals, industrial plants, emergency corps of gas companies, etc.

PULQUE, a drink of Central America and Mexico; fermented from agaves and cacti.

PULSATILLA, PASQUE FLOWER (*Anemone pulsatilla*), plant or order Ranunculaceae; mauve-colored; poisonous.

PULSE, the throbbing of the arteries due to the additional quantity of blood forced through them by the contraction of the ventricles of the heart.

PULTUSK (52° 43′ N.; 21° 12′ E.); town, Russ. Poland, on Narev; woolens. Pop. 17,500.

PUMA. See under CAT FAMILY.

PUMICE, lava composed of silica and alumina, ejected by volcanoes; colors: grey, white, brown, or black; varieties: glassy, common, and porphyritic; hard, rough, and porous—floats in water; used for polishing wood, ivory, marble, etc., and for toilet.

PUMP, machine for raising fluids; the commonest, the suction pump, consists of a piston working air-tight inside a barrel, and moved up and down by a handle attached by a rod. The piston has a valve opening upwards, and a similar valve is fitted at the bottom of the barrel, covering the mouth of a tube sunk into the water. As the piston is raised the air below is rarefied, and the atmospheric pressure on the surface of the water forces it to rise in the tube until equilibrium is regained. After some strokes the water gets above the piston, and being raised with it is discharged by a spout. Other pumps are the force pump, a more effective form of suction pump; rotary pumps, including the centrifugal pump, in which water is driven by rotary motion along the vanes of a wheel, from center to circumference, thus gaining sufficient velocity to force it through the discharge pipe; another rotary pump is the drum pump—a displacement pump with tight-fitting parts by means of which a theoretically constant volume of water is discharged per revolution. Neither of the types of rotary pumps is adapted for very high lifts owing to the difficulty of keeping the working parts tight in the casing. In the *pulsometer* pump there is no bucket, plunger, or rotating fan. The water is discharged by the pressure of steam acting directly on the surface of the water in the pump chamber. The air pump is used to exhaust the air in, or pump air into, a vessel.

PUMPELLY, RAPHAEL (1837-1923) geologist; *b.* Owego, N.Y. He studied geology and mining abroad at Paris, Hanover, and Frieberg, and explored the geology of Corsica. He returned home 1860, to manage mines in Arizona, then examined the geology of Yezo for Japan

and the coalfields of N. China for the Peking Government. After serving as professor of mining and geology at Harvard, 1866-73, and as State Geologist of Michigan, 1869-71, he joined the U.S. Geological Survey, in 1879, and directed the Northern Transcontinental Survey, of 1881-84, in Dakota, Montana, Idaho, and Washington. His geological investigations of Michigan and W. Ontario are credited with initiating the development of the iron ore industry in those sections.

PUMPKIN, or **CUCURBITA PEPO,** a half-hardy plant, with large solitary yellow flowers, and rough leaves, which are sometimes eaten instead of spinach. The fruit is used either as a vegetable, like vegetable marrow, or as a fruit in pies, etc.

PUN, play on words, alike in sound, but different in meaning, *e.g.*, Hood's 'They went and told the sexton, and the sexton told the bell.' The P. is eschewed in modern wit. Noted punsters were Lamb, Sidney Smith, Hood, Hook, Wilberforce, Oliver Wendell Holmes.

PUNCH, or the *London Charivari,* is the most famous Eng. journal of humor. The first number appeared on July 17, 1841, Henry Mayhew and Mark Lemon being joint-editors. Among famous contributors have been Douglas Jerrold, Tom Hood, Albert Smith, Thackeray, and illustrators such as Browne, Leech, Tenniel, Du Maurier, Keene, and Furniss.

PUNCTUATION, the art of dividing a sentence by conventional signs. The 'stops' are: full stop (1), colon (:), semicolon (;), comma (,). Other signs are: mark of interrogation (?); mark of exclamation (!), wrongly used when intended to point out a joke; brackets (()), and dashes (— . . . —), used in parenthesis.

Rules for P. are useless; the sentences of good writers should be studied.

PUNDIT, a Brahman teacher; P.'s have done much in exploration for Ind. Government; in Kashmir a P. is a native official.

PUNIC WARS, wars between Romans and Carthaginians (*i.e.*, descendants of Phoenicians (*Poeni,* adj. *punicus*), in III. and II. cent's B.C.

First Punic War (264-241 B.C.), was occasioned by Carthaginian interference in Sicily. Fruitless fighting took place in Sicily, 263-257; Rom. naval victory at Cape Ecnomus and invasion of Africa, 256. Carthage was beaten, but reorganized forces, defeated Regulus near Tunis, 255, and drove Romans from Africa. War in Sicily, 254-242, wearied both parties; Hamilcar Barca commanded Carthaginians from 247. After destruction of Carthaginian fleet at Aegates, 241, Sicily surrendered to Rome.

Second Punic War (218-201), Hamilcar Barca found outlet for his energy in Span. conquest, aided by his young *s.*, the warrior Hannibal, and *son-in-law,* Hasdrubal, who founded Carthagena. Hasdrubal made treaty with Rome as to boundary of his Span. dominion; Rome declared war on capture of Saguntum by Hannibal, 219. While Rom. armies set out for Spain and Africa, Hannibal marched over Alps into Italy; Carthaginian victories culminated at Lake Trasmene, 217, and Cannae, 216. Fabian tactics of Quintus Fabius Maximus at last brought Romans victory of Metaurus, 207; Carthaginians departed, 203. The Scipios had conquered Spain, 206, and P. Scipio inflicted final defeat in Africa at Zama, 202.

Third Punic War (149-246).—Destruction od Carthage preached by the elder Cato and carried out by Scipio Aemilianus. Mommsen, *History of Rome.*

PUNISHMENT, the infliction of a penalty for the breach of a command or law. The three chief theories of the purpose of punishment by the state are that it is (1) retaliatory, (2) deterrent, (3) reformatory.

PUNISHMENT, CAPITAL. See CAPITAL PUNISHMENT.

PUNJAB, or **PANJAB** ('the land of five rivers'—*i.e.*, Jhelum, Chenab, Ravi, Beas, and Sutlej), on N.W. frontier of Brit. India (30° N., 74° E.); is bounded on the N. by Kashmir, on the E. by Himalayas and United Provinces, on the S. by Rajputana and Sind, and on the W. by Baluchistan and N.W. Frontier Prov. Area, 135,880 sq. m. Pop. 23,807,700 (c. one-thirteenth of area and Pop. of Indian Empire). Native states, 34, occupy 36,551 sq. m.; pop. 4,212,800. Vast alluvial plain from Jumna in the W. to Suleman Range in the S.; N.E. occupied by Himalayas. Five matural divisions: Himalayan tract, with scanty pop. and over 22,000 sq. m.; Salt Range tract, broken and confused, similar to Himalayan tract; narrow submontane tracts, skirting base of hills and including low range of Siwaliks, very fertile and thickly populated (4,000,000); E. plain (36,000 sq. m.; pop. 10,500,000; irrigation not necessary in favorable seasons; pop. largely urban); W. plain (59,000 sq. m.; pop. 6,000,000; irrigation necessary; includes colony areas on the Lower Chenab and Lower Jhelum canals—fertile, wealthy, and populous). Chief towns: Sialkot, Lahore (cap.), Amritsar,

Multan, and Lyallpur. About half pop. is Mohammedan, three-eights Hindu, and one-eighth Sikh. Jats number *c.* 4,000,000, and are most important of landed classes; next come Rajputs (1,500,000). Jats and Rajputs provide best recruits for Brit. army. Agriculture is the staple industry. Lower Chenab Canal irrigates *c.* 1,900,000 acres. Lower Jhelum 390,000 acrea, and Lower Bari Doab Canal (when complete) 1,200,000 acrea of what was formerly waste. Wheat is most important crop; other staples barley, rice, millet, maize, oil-seeds, cotton, and sugar-cane. Live stock very abundant. Mineral wealth small; *c.* 184 factories for cotton ginning, cleaning, and pressing. Administration in hands of lieut.-governor, executive council, and legislative council. Education has recently made great strides; government college at Lahore; nine arts college and professional schools.

PUNO.—(1) A dept. of S.E. Peru, bordering on Bolivia, almost enclosed by ranges of the Andes. Area 41,198 sq. m. Pop. about 540,000. (2) Cap. of above, on the Bay of Puno and the W. shore of Lake Titicaca, 110 m. from Arequipa. Alpaca wool is exported, and some silver mines are still worked. Pop. 6,000.

PUNTA ARENAS (9° 59′ N.; 84° 46′ W.), seaport, capital of Punta Arenas, Costa Rica, on Gulf of Nicoya; exports coffee. Pop. 3,700.

PUPIN, MICHAEL IDVORSKY (1858), a university professor; *b.* at Idvor, Banat, Hungary; *s.* of Constantine and Olympiada Pupin. He was educated at Columbia University and at the University of Berlin. From 1889-90, he was an assistant teacher in electrical engineering at Columbia University, and after being an instructor in mathematics, 1890-02, and adj. prof. of mechanics, 1892-1901, he became professor of electro-mechanics at that institution in 1901.

PURBECKIAN, a group of rocks; members of Jurassic system; well seen at Purbeck, Dorset—hence name; composed of argillaceous and calcareous shales, limestones, and marbles.

PURCELL, HENRY (1658-95), Eng. composer; *b.* Westminster; studied with Blow and others; app. organist of Westminster Abbey, 1680; of Chapel-Royal, 1682. Combining great technical skill with deep emotional expression and genuine inspiration, P. ranks as England's greatest composer; *Te Deum* and *Jubilate*, and *King Arthur*, best works; *Dido and Aeneas* (opera).

PURCHAS, SAMUEL (*c.* 1575-1626), an English author and clergyman; rector of St. Martin's Ludgate, from 1614. P is noted for his works of travel, *Purchas his Pilgrimage*....., *1613-14*, and *Hakluytus Posthumus*.....(4 vols., *1625*; new ed., *1905-7*). The 4th ed. of the former is sometimes printed as a 5th vol. of the latter, the five being entitled *Purchas's Pilgrimes*. This work is rare. See *Biog-Bril.*

PURE FOOD LAW. See ADULTERATION OF FOOD.

PURGATORY, in Catholic theology, the place where the souls of such as are not pure enough to go straight to Heaven are purified. Belief in it is connected with the practice of Indulgences.

PURI, JAGANNATH (19° 48′ N.; 85° 31′ E.), town, and district, Orissa Division, Bihar and Orissa, India; contains famous temple of Jagannath. Pop. *c.* 40,000 (fluctuating); district 1,120,000.

PURIFICATION, practice found in most religions of cleaning by ritual acts. Many different kinds could be enumerated. The idea attains to highest form in the Christian rite of baptism—*cf.* anointing, sacrifice, mutilation.

PURIM, feast of the Jews on 14th and 15th of the month of Adar, traditionally observed in commemoration of their delivery from Haman, during the reign of King Artaxerxes, the account of which is contained in the *Book of Esther*. Its real origin is obscure, but it was probably adopted by the Jews during the captivity from the Persians, who themselves borrowed and modified an ancient Babylonian festival.

PURINGTON, EDWARD EARLE (1878), an American author; *b.* at Morgantown, W. Va.; *s.* of Daniel Boardman and Florence Abbey Lyon Purington. He was educated at Doane Academy, Granville, O., and at Denison University. He became an instructor at the former institution, in 1900, and later was editorial counsel or director of various publications and a lecturer on health, psychology, efficiency, and other subjects, after which he was an efficiency analyst and counsel. In addition to numerous articles to various magazines he was the author of *Efficient Living, 1915*; *The Triumph of the Man Who Acts, 1916*; *Petain, the Prepared, 1917*; *Practical Course in Personal Efficiency, 1917*; and *Personal Efficiency in Business, 1919.*

PURITANISM, name given to religious movement of XVI. and succeeding cent's, averse to Catholicism and ritual.

PURITANS, Church reforming party,

owing its origin to Wyclif and the Lollards, but prominent after formulation of constitution, articles, and ritual of Church of England, by Archbishop Parker, in Elizabeth's reign. Serious differences thereupon manifested themselves among the clergy, those who demanded greater strictness of life and doctrine being called in derision *Puritani*. Party was not united; extreme section led by Thomas Cartwright, 1535-1603, who preferred Presbyterial to Episcopal system; moderate section simply wished to draw strongly marked line of doctrinal demarcation between the standards of the two Churches. Later, 1580, the Independents (afterwards most powerful of all), under leadership of Robert Browne, 1550-1633, advocated congregational system. Puritans only became a political power when constitutional offences of Charles I. forced them to oppose him. Laud and High Church party, with tendency to Arminianism, led Puritans to emphasize Calvinistic element in their doctrines. During Commonwealth Puritanism supreme. After restoration moderate Puritans made their peace with the Church, and in later days became Evangelicals. Other sections, refusing to accept Act of Uniformity, 1662, resolved themselves into various groups, and developed into Nonconformist party of today, or crossed the Atlantic and joined expatriated brethren in New England. In Scotland Puritanism, as Presbyterianism, took firm root and was systematically formulated into the Church of Scotland, and was the leaven which led to what is known as the 'second reformation,' 1638, later on inspiring the various secessions from the Church of Scotland, of 1733, 1752, and 1843. 'The Puritan divines,' Richard Sibbes, John Owen, Thomas Goodwin, Thomas Adams, John Howe, Stephen Charnock, Richard Baxter, and Matthew Henry, set forth the distinctive doctrines and principles.

PURNEA (25° 46′ N.; 87° 30′ E.), district, Bhagalpur Division, Bihar and Orissa, India. Pop. 1,875,000. Capital, Purnea. Pop. 14,300.

PURPLE COLORS are obtained by an admixture of red and blue light rays. The colors vary from scarlet to violet, according to the predominance of the red or blue rays. In the case of paints, P.C. is obtained by mixing red and blue pigments in various proportions. Tyrian purple, which was held in great repute in the ancient world, was obtained from the juice of a shell-fish called *Murex* or *Conchylium*.

PURULIA (23° 19′ N.; 86° 24′ E.), town, Chota Nagpur Division, Bihar and Orissa, India. Pop. 18,000.

PURVEYANCE, Eng. legal term for royal right (abolished in 1604) to impress goods or labor at valuation fixed by appraisers.

PUSA (26° 10′ N., 85° 43′ E.), village, Darbhanga district, Tirhut Division, Bihar and Orissa, India; Government Agricultural Station. Pop. 5,000.

PUSEY, EDWARD BOUVERIE (1800-82), Anglican divine; ed. Oxford; Regius prof. of Hebrew, 1829; leader of High Anglican movement; aimed at restoring Catholicism in Anglican Church, though not a ritualist. A learned man, he was hardly a great thinker, but an able controversialist, and learned in ecclesiastical antiquity; wrote *Doctrine of the Real Presence*, and *What is of Faith as to Everlasting Punishment*.

PUSHKAR (26° 30′ N., 74° 36′ E.); town, Rajputana, India; place of pilgrimage. Pop. 4,000.

PUSHKIN, ALEXANDER (1799-1837), famous Russ. poet and novelist; *b.* Moscow; entered lyceum, Tsarskoe Selo, near St. Petersburg, 1811; received post in Ministry of Foreign Affairs, 1817; killed in duel in St. Petersburg. P. wrote excellent lyrics; greatly influenced by Byron; *Eugene Onegin*, *Poltava* (narrative poems); *The Captain's Daughter*, *History of the Revolt of Pugachev*)prose works); *Boris Godunov* (tragedy); *The Prisoner of the Caucasus*.

PUSHTU, PUKHTU, language of Pathans, Afghanistan; derived from Zend and mixed Arabic, Persian, Hindustani.

PUTEAUX (48° 50′ N., 2° 18′ E.); town, Seine, France, on Seine; iron manufactures. Pop. 29,000.

PUTEOLI (*c.* 40° 48′ N., 14° 8′ E.); ancient town, on site of modern Pozzuoli, Italy; colonized by Romans, 194 B.C. Modern town has arsenal. Pop. 24,000.

PUTNAM, a city of Connecticut, in Wyndham co., of which it is one of the county seats. It is on the New York, New Haven and Hartford Railroad, and on the Quinebaug River. It is the center of an extensive agricultural region. Its industries include iron works, cotton mills, woolen mills, silk mills, trunk factories, boot and shoe factories, etc. The city has a public library and a hospital. Pop., 1920, 7,711.

PUTNAM, FREDERICK WARD (1839-1915), anthropologist, zoologist; *b.* at Salem, Massachusetts. From 1856-1864 curator of ornithology, 1864-1866 curator of vertebrata, 1866-1873 superintendent of museum, 1871-1894 vice-

president of Essex Institute; 1867-1869 director of museum of Peabody Academy of Sciences, Salem; assistant, in 1874, of Geological Survey of Kentucky; Survey West of 100th Meridian, United States Engineers, 1867-1869; at Harvard College, 1886-1909, as professor of American archaeology and ethnology; 1910, professor emeritus, 1874-1909 curator Peabody Museum of Harvard College; 1909-1913 honorary curator, 1913 honorary director in charge. From 1903-1909 at Anthropology Museum, University of California, as professor of anthropology and director; professor emeritus, 1909, State Commissioner, 1882-1889, of inland fisheries. At the Chicago Exposition, 1891-1894, chief of the department of ethnology; 1894-1903 curator of anthropology at the American Museum of Natural History. Decorated by the French Government, and was the author of many papers on zoology and anthropology.

PUTNAM, GEORGE HAVEN (1844), a publisher; *b.* at London, Eng.; *s.* of George Palmer and Victorine Haven Putnam. He was educated at Columbia Grammar School, New York, The Sorbonne, Paris, and at the University of Gottingen. He was pres. of G. P. Putnam's Sons, publishers, of New York, and also a director of the Knickerbocker Press. He served during the Civil War, led in organizing The American Copyright League, in 1887, and became its secretary during the contest for international copyright, resulting in copyright bill of March, 1891, and in addition to contributing to the Encyclopedia Britannica, etc., was the author of several books including *Abraham Lincoln—the People's Leader in the Struggle for National Existence, 1909.*

PUTNAM, HERBERT (1861), librarian; *b.* at New York; *s.* of George Palmer and Victorine Haven Putnam. He was educated at Harvard and at Columbia Universities. After studying law at the latter institution he was admitted to the bar, in 1885, however, except for three years' law practice, at Boston, 1892-5, he did not follow law as a profession, being engaged instead as a librarian, first, in Minneapolis, then in Boston, and finally became librarian of Congress, in 1899. He published numerous articles in reviews and journals.

PUTNAM, GEORGE PALMER (1887), an American publisher and author; *b.* at Rye, N.Y.; *s.* of John Bishop and Frances Faulkner Putnam. He was educated at Harvard University, and at the University of California. In 1909, he became connected with the educational department of G. P. Putnam's Sons, publishers, New York, but the following year went to Oregon, and was later publisher of the *Bend (Ore.), Bulletin.* Mayor of Bend, Ore., for two terms, 1912, 1913, and secretary to the Governor of Oregon, from 1914-17. In 1919, he bceame president of the Knickerbocker Press, and treasurer of G. P. Putnam's Sons, New York. Author of *The Smiting of the Rock,* 1918, and others.

PUTNAM, ISRAEL (1718-1790), American Revolutionary soldier; *b.* in Salem (now Danvers), Massachusetts, January 7, 1718; *d.* in Pomfret (now Brooklyn), Connecticut, May 19, 1790. Little is known of his early life. In 1755 he commanded a company of Connecticut volunteers in the regiment sent to New York to repel a French invasion. He was at Lake George, and did good work as scout and ranger. Commissioned major by the Connecticut Legislature, in 1757, he was with the advance guard of Abercrombie's expedition against Ticonderoga, replacing Howe (who was shot), as aide to Abercrombie in the retreat. While trying to capture enemy stores that summer he was caught and tortured by the Indians, and only saved by the intervention of a French officer. After imprisonment, he was exchanged, in 1759, and promoted to Lieut. Colonel, and ordered to Montreal, whose surrender gave Canada to England. Commanding 1,000 troops in the naval expedition against Havana, his ship was wrecked off the Cuban coast. The troops got ashore on rafts and reached Havana in time to make a successful attack. He commanded a regiment sent to relieve Detroit, in 1764, and then retired to his farm, until the revolution. As brigadier-general, he organized a Connecticut regiment, and fought in The Battle of Breed's (Bunker) Hill. Appointed major-general, he was next engaged in the battle of Long Island. In May, 1777, he was removed from command for the loss of Fort Montgomery and Fort Clinton, but was acquitted after an inquiry. Surprised by the British, under Tryon, at Horseneck, Conn., in 1779, he made his escape by dashing down a precipitous height on his horse, and later overtook Tryon, and captured 50 prisoners.

PUTNAM, WILLIAM LE BARON (1835-1918), judge; *b.* at Bath, Maine. In 1855, graduated from Bowdoin College; 1858, admitted to the bar, and practiced in Portland from 1858-1892; was mayor of Portland, in 1869, and declined two appointments as judge of the Maine Supreme Court; appointed by President Cleveland a commissioner to Great Britain to settle differences of American sailors in Canadian waters.

PUTNEY (51° 28′ N., 0° 13′ W.), suburb of London; part of Wandsworth borough; P. Bridge is starting-point of Oxford and Cambridge boat races.

PUTNIK, FIELD-MARSHAL (1847), Serbian generalissimo; *b.* Kragujevatz. On restoration of the Karageorgevitch dynasty he was promoted general, and held portfolio of minister of war. He reorganized the army, and the successes of Serbia against Turkey and Bulgaria were due to his strategy and skill. On the outbreak of the World War, he was arrested in Vienna, but after two days' imprisonment was given his freedom. He immediately took his place as commander-in-chief, and was responsible for the gallant stand made by Serbia until the retreat, in 1915.

PUTREFACTION, the decomposition and decay of animal and vegetable matter. Chemical change is brought about by bacteria, ptomaines being formed and malodorous gases given off.

PUYALLUP, a city of Washington. Pop. 1920, 6323.

PUY-DE-DOME (45° 45′ N., 3° 10′ E.), central department, France; area, 3,090 sq. miles; surface generally mountainous, reaching extreme height of 6,186 ft. in Puy-de-Sancy; watered by Allier, Cher, Dordogne; chief town, Clermont-Ferrand. Produces wine; has large deposits of coal; silver lead mined; many mineral springs. Pop., 1921, 490,560.

PYÆMIA, a disease due to the presence in the blood of pyogenic or pus-forming micro-organisms, usually streptococci and staphylococci. It differs from *sepicaemia,* the general term for invasion of the blood by microbes, in the formation of metastatic, or secondary, abscesses. It is caused by the germs from an acute primary abscess injecting emboli, or particles of fibrin carried along in the blood stream; where these emboli lodge, a metastatic abscess is formed, which is more or less dangerous, according to its situation.

PYAPUN (16° 16′ N., 95° 40′ E.), town and district, Lower Burma, on Pyapun. Pop., town, 6,000; district, 230,000.

PYAT, AIMÉ-FELIX (1810-89), Fr. publicist, dramatist, and politician; took prominent part in July Revolution and in Fr. literary life of time of George Sand; opposed romanticism as conservative movement.

PYATIGORSK (44° 5′ N., 42° 10′ E.), town, watering-place, Terek Territory, Russian Caucasia; sulphur springs. Pop. 21,000.

PYGMALION (classical myth.) made an ivory statue of a girl. In answer to his prayer, Aphrodite breathed life into the statue and P. married the maid. W. S. Gilbert called her Galatea in his comedy without classical authority.

PYGMY, term used for human races of small stature, *i.e.,* about 4 or 4½ feet. They are found in various parts of Africa, and in the Malay Archipelago. The former are sometimes called *Negrilloes,* the latter *Negritoes.* According to some ethnologists they are the remains of a primitive race whence on the one side the African negroes, on the other the Malay races are descended. Though this theory is unproven, it has much to recommend it. P.'s vary in color, generally dark brown. They are fairly intelligent and are of a refined disposition.

PYLE, HOWARD (1853-1911), illustrator and author; *b.* Wilmington, Del. He contributed artistic and literary work to New York periodicals, made a special field of colonial life, and mediaeval folk lore, and was notable as a writer of books for children, illustrated by his own drawings. He conducted a successful art school in his home city, and was art instructor at the Drexel Institute., Philadelphia.

PYLOS, modern **NAVARINO** (36° 54′ N., 21° 43′ E.), ancient town, Messenia; home of Neleus and Nestor; fortified by Athenians under Demosthenes, 425 B.C.

PYM, JOHN (1584-1643), Eng. statesman; agitated for execution of penal laws against Catholics, 1621-25; pressed for Act for redress of grievances, supported Petition of Right, impeachment of Mainwaring for royalist speech, and joined attack on Buckingham, 1628; member of committee to inquire on state of kingdom, Nov. 10; carried up impeachment of Strafford to Lords, Nov. 11, 1640; moved impeachment of Laud. P. was impeached, Jan. 3, 1642, with other five members; king's attempt to carry out arrest failed. P. was a member of committee of public safety which organized the revolution; effected alliance with Scotland; a Puritan, but noted for good temper and reasonableness.

PYORRHEA, or **RIGGS DISEASE,** a bacterial disease of the gums, at the roots of the teeth, manifesting itself in the formation of pus, not exteriorally visible. Much attention has been devoted to it within recent years, some authorities attributing to it the character of a cause of many other afflictions, such as rheumatism. It usually appears during or after middle age, the cure

usually being the extraction of the teeth. Other authorities regard the disease merely as a symptom of a disordered metabolism which may be cured by a dietetic regimen.

PYRAMIDS, structure of stone or brickwork, standing on a square base and tapering upwards to an apex. Commonly erected in ancient times to the memory of some dead ruler. The Egyptians were particularly noted as pyramid-builders, and about forty P.'s erected between 4000 B.C., and 2000 B.C., still stand in Egypt. In most cases they are built over a chamber containing the sarcophagus of a king. Limestone was the chief material used, but huge blocks of granite formed the outer casing. In every instance the four points at the base were so placed as to face the four points of the compass. An intricate passage was left during the raising of each pyramid, leading to the central chamber. The best-known group of pyramids is that of Gizeh, a few miles N. of Cairo. There are eleven in this group—that of Cheops, which is 450 ft. in height, and contains over 80,000,000 cubic ft. of masonry, being the largest and most imposing in the country. The pyramids suffered considerably from the Arab spoliations in VII. cent. A.D.

PYRAMUS AND THISBE (classical myth), lovers who met clandestinely. One night T., arriving first saw a lioness and fled, dropping her cloak; P. arrived to find it blood-stained, and thinking T. dead, slew himself. T. returning saw his corpse, and in despair killed herself

PYRENEES (42° 45′ N., 0°), great mountain chain stretching from S.E. corner of Bay of Biscay eastward to Mediterranean along borders of France and Spain, with total length of *c.* 280 miles. W. part has height of 3,000–4,000 ft.; in center, highest points range from 9,500 to 11,168 ft., and include Monte Aneto (11,168 ft.) and Mont Perdu (10,994 ft.); E. part has elevation of 9,500 to 2,000 ft. at extreme E. end.

PYRENÉES-ORIENTALES (42° 35′ N., 2° 30′ E.), S.W. department, France; area, 1,598 sq. miles; extends from Mediterranean inland along N. side of Pyrenees; watered by Agly, Tet; chief town, Perpignan; has large deposits of iron ore; produces vines, mulberries, chestnuts, olives, timber; manufactures wines. Pop., 1920, 217,503.

PYRETHRUM, genus of plants, order Compositae; best known species is Feverfew (*q.v.*).

PYRGI, ancient town, Eturia, Italy.

PYRGOS (37° 40′ N., 21° 26′ E.), town, Achaea and Elis, Greece. Pop., 1920, 13,240.

PYRHELIOMETER, the instrument by which the intensity of the heat of the sun's rays is measured. As used by the U.S. Weather Bureau, it consists of two strips of blackened silver, which are placed in circuit with an electrical resistance thermometer; this accurately measures their temperature by means of their resistance. An automatic shutter permits sunlight to fall on the strips, alternately, for one minute at a time. The temperature rise in these strips bears a direct relation to the intensity of the heat rays falling onto them, which is, therefore, determinate. These instruments date back to Pouillot's first instrument, in 1837.

PYRIDINE, C_5H_5N, a basic compound occurring in coal-tar and in the oil obtained by the distillation of bones, from both of which substances it may be separated by distillation of the basic portion. Pyridine is a strong-smelling liquid (sp. gr. .99) that mixes with water and boils at 116.7° C. It forms salts with acids, and is of similar structure to benzene, five CH groups being united in a ring by a nitrogen atom. It is the parent substance of a large number of derivatives some of the natural alkaloids, such as nicotine and piperine. Pyridine is used on the Continent for 'denaturing' alcohol, to render it unfit for use as a beverage.

PYRITES. Iron Pyrites, FeS_2, is a yellow mineral occurring crystallized in the cubic system in quartz veins, slate, coal, etc.; probably formed by reduction of ferrous sulphate by organic matter. Often contains copper (copper pyrites), cobalt, nickel, arsenic, and gold. Found chiefly in Spain, France, and the U.S., and used for sulphuric acid manufacture. Copper pyrites or chalcopyrite, $CuFeS_2$, is similar, but softer and darker in color.

PYROGRAPHY, the production of designs on wood by 'charring' with hot metallic points. The work is executed by three methods: (1) By burning with red-hot pokers resembling plumber's soldering irons. This is termed 'poker-work.' (2) By ignited gas, spirit, etc., injected from an indiarubber bag into a point. (3) By electricity. This produces the best effects. The electric poker is made of platinum at the working end, and the electric current develops a red heat in a constriction of the metal.

PYROLUSITE (MnO_2), an iron-black colored mineral occurring in opaque masses; not known in crystals. It is the chief ore of manganese, and is extensively mined in Australia, Japan, India, U.S., and Central Europe.

PYROMETER, an instrument for measuring temperatures exceeding those capable of registration by the mercurial Thermometer—*i.e.*, above 550° C. Instruments used depend on a variety of principles, of which the following are the chief: (1) Expansion of a gas; (2) point of fusion or softening of a solid; (3) heat evolved by the cooling of a known mass of metal; (4) electromotive force set up on heating the junction of two dissimilar metals; (5) change in the electrical resistance of a heated wire; (6) determination of the color; (7) of the intensity of light emitted by a glowing body; and (8) the permanent deformation of a special test piece on heating. Different kinds kind are indicated on p. 368. Devices based on (4) and (5) are probably the most widely used and exact methods of pyrometry. By means of the Uhling pyrometer (based on the expansion of air) it is possible to construct a scale of temp. reaching as high as 1,500° C.

PYROPE, a variety of garnet found in certain rocks of Bohemia and Saxony; composed of silica, alumina, magnesia, and lime; varieties: fire garnet, carbuncle, Bohemian garnet, and hyacinth.

PYROTECHNICS, the art of making fireworks, especially for purposes of public amusement or rejoicing. This art is of unknown antiquity and was practiced among the Chinese (*cf.* Chinese Crackers) from the earliest time, but naturally the art did not reach a very developed stage in Europe until after the discovery of gunpowder and the growth of modern chemistry. Fireworks may be roughly divided into two kinds: Simple hand-pieces, such as squibs, Roman candles, Bengal lights, crackers, rockets, etc.; and fixed contrivances, such as Catherine wheels, golden rain, etc.

PYROXENES, group of important rock-forming minerals, including augite, enstatite, bronzite, and hypersthene.

PYROXYLIN, or **COLLODION COTTON,** is a nitrated cellulose in which the nitration has not been carried so far as in gun cotton. It is prepared by adding purified cotton wool to a mixture of concentrated nitric acid and sulphuric acid, and afterwards thoroughly washing with water. The temperature, the time of nitration, and the concentration of the acids have their effect on the product. The product is inflammable and should be entirely soluble in a mixture of alcohol and ether. It is used for the preparation of collodion, celluloid, and some kinds of smokeless powders.

PYRRHUS (*c.* 318-272 B.C.), king of of Epirus; over-ran Macedonia; expelled, 286; led army to aid Tarentum, 281, and for first time Greeks came into conflict with Romans at battle of Heraclea, 280; victory of P. was dearly bought—hence expression, a 'Pyrrhic victory'; further victories, 279, but decisively beaten at Beneventum, 275.

PYRROL (C_4H_4NH), liquid obtained from bone oil and coal tar; B.P. 131° C.; with hydrochloric acid colors wood red; feeble secondary base.

PYTHAGORAS OF SAMOS (VI. cent. B.C.), Gk. philosopher, of whose life little is known; settled at Crotonia in Magna Graecia, and there founded an order or society. The first purpose of the order was ethical and religious, and in this it resembled the Orphic societies, which also represented dissatisfaction with the local cults of Gk. cities, and aimed at purification of the soul by abstinence and ceremonial 'mysteries.' But the order came into conflict with established political custom, and after a period of power was in V. cent. ejected from Crotona and in part dispersed through the Gk. world.

PYTHEAS (fl. early III. cent. B.C.), Gk. navigator and astronomer; *b.* Marseilles; navigated North Sea as far as 'Thule,' perhaps island of Shetlands; penetrated into Baltic; knowledge of his travels preserved by other writers; nucleus of much myth, but has claim to astronomical discoveries. See GEOGRAPHY.

PYTHIAS, KNIGHTS OF. See KNIGHTS OF PYTHIAS

PYTHIAS. See DAMON.

PYTHON (classical myth.), serpent formed from mud left by Deucalion's deluge; slain by Apollo.

PYTHON. See under SNAKES.

PYX, TRIAL OF THE (Lat. *pyxis*, a box or chest), the final and public weighing and assaying at the Mint of the gold and silver coinage of the realm, by way of public attestation of its standard purity. The first regular public T. of the P., according to Madox, took place as long ago as the reign of Edward I., when the king commanded the Exchequer barons to open the boxes of the assay of London and Canterbury, and make the assay in such manner as the royal council used to do.

Q

Q, 17th letter of alphabet; originally a picture of a knee; Hebrew *qoph*, Greek, *koppa*; arrived in England in Mid-XII. cent. and replaced O. E. *cw* (O. E. *cwyc*=quick); in Middle Scots *qu*=*hw* (Middle Scots *quhat*=O. E. *hwat*, modern *what*).

QARAITES, KARAITES, mediæval Jewish sect, so-called because of their emphasis on the sacred text as opposed to tradition; they arose in VIII. cent.; about 12,000 exist, mostly in Russia; they have a good reputation, and are favored by the Russ. government.

QUACKENBOS, JOHN DUNCAN (1848), an American physician; *b.* at New York; *s.* of George Payn and Louise B. Quackenbos. He was educated at Columbia University. He was engaged in the practice of medicine at New York after 1871, specializing in mental and moral diseases. He was also professor of rhetoric and English language and literature and after 1894, professor emeritus at Columbia University and was the author of several books on medicine, rhetoric and various other subjects.

QUADRAGESIMA (Fr. *Careme*), an early name for the forty days' fast of Lent, and especially applied to the first Sunday in Lent—that is, the Sunday after Ash Wednesday. The Advent fast has also been sometimes known as Quadragesima Sancti Martini, thereby connecting the feast of St. Martin with the preparation for Christmas, as though the Advent season had formerly lasted for six weeks instead of four.

QUADRANGLE, in geometry, a plane figure having four sides and four angles. The term is also applied to the square or quadrangular courts around a building.

QUADRANT. See SEXTANT.

QUADRATIC EQUATION. See EQUATION.

QUADRATRIX, curve with ordinates proportional to area (quadrature) of another curve.

QUADRATURE, finding a square of area equal to the area bounded by any lines, straight or curved; finding the q. of a circle is the old game of 'squaring the circle.'

QUADRILLE, the name of a square dance of French origin; four couples take part and there are five separate and complete figures, the whole forming 'a set of Q's'. It was popular in the early 19th century. Q. is also an old card game, played by four persons with a pack from which the tens, nines, and eights were removed. It superseded ombre about 1726 and was superseded by whist.

QUADRIREME (*quattuor* four, and *remus*, oar), the name of an ancient ship of war which had four banks of oars instead of the more usual three of the trireme. It was first introduced by Dionysius of Syracuse.

QUADRUMANA, an obsolete order of four-handed primates invented by Cuvier to include the apes, monkeys, and lemurs, but excluding man, who was placed in the order Bimana.

QUADRUPLE ALLIANCE (1718), was made between Triple Alliance (Britian, France, Holland) and Austria to counteract Span. schemes and to enforce terms of Treaty of Utrecht which related to Hanoverian Succession in Britain and Orleans Succession in France.

QUÆSTOR, Rom. official who had originally criminal, later chiefly financial, jurisdiction; nominated by consuls till middle of V. cent. B. C., when right of election fell to *comita tributa*. Number increased from 2 to 4 (421 B. C.), 8 (c. 267), and to 20 by Sulla, 81 B. C.

QUAGGA. See under HORSE FAMILY.

QUAIL. See under PHEASANT FAMILY.

QUAIN, SIR RICHARD, Bart. (1816-98), Irish physician; practiced in London; physician to Brompton Hospital for Diseases of Chest, 1855; physician-extraordinary to the queen; an authority on heart diseases, and author of *Dic-*

tionary of Medicine. His cousin, Jones Quain, 1796-1865, was the author of the well-known standard *Elements of Anatomy,* and Richard Quain, 1800-87, *bro.* of Jones Q., was pres. of Royal Coll. of Surgeons, 1868.

QUAKERS, name (at first nickname) of Society of Friends. See FRIENDS, SOCIETY OF.

QUARANTINE, the period during which an arriving ship is kept off shore by the port authorities because of suspected or actual contagious sickness on board. The term was applied originally to the custom adopted by Mediterranean ports authorities of taking precautionary measures against the presence of plague, yellow fever, or cholera on incoming vessels, especially from the Levant, by compelling crews and passengers to spend forty days (hence the term *quarantina*) in a lazaretto, in which period the cargo was also purified by exposure. In these ports the custom is still observed. Other countries adopted a uniform quarantine code, by which a ship receives a 'clean' or 'foul' bill of health on leaving a port. In the United States there is both federal and State jurisdiction over quarantine. Under federal laws the Public Health and Marine Hospital Service conducts all the maritime quarantines of the United States, except at Boston, New York, Philadelphia, Baltimore and Galveston. At these ports the quarantine of vessels is under the control of the state, whose health officers are vested with broad powers and have almost absolute control of incoming vessels and their passengers.

QUARLES, FRANCIS (1592-1644), Eng. religious poet; most voluminous in production; best work, *Emblems;* figures in Pope's *Dunciad.*

QUARNERO, GULF OF, in the Adriatic Sea, between Istria and the Croatian coast. It is 15 miles in length and breadth.

QUARRYING, known as early as 4000 B. C. Quarries from which stone for the Pyramids was cut are still to be seen near Cairo. Q. is practiced on an extensive scale in Britain; Craigleith (sandstone), Aberdeenshire (granite); limestone quarried in N. Eng., and small marble quarries exist in Skye and parts of Ireland, but Italian marble is preferred. U. S. A. possesses supplies of stone for quarrying.

QUART, an English measure of capacity, being equal to two imperial pints and the fourth part of a gallon. A Q. of water contains 69.3185 cu. in. and weighs 2½ lbs. avoirdupois. It i equal to 1·1359 litres.

QUARTER-DECK, originally a smal ler deck placed above the half-deck an covering about a quarter of the vesse It is now used for that part of the spa deck extending between the poop an the mainmast, used by officers onl and in passenger vessels by first-clas passengers.

QUARTERMASTER, an officer i the army who attends to the quarter provisions, fuel, etc. of the soldier The chief of the supply department i called the Quartermaster-General.

QUARTER-STAFF, pole, 6 to 8 f long; grasped in middle by one hand an midway between middle and end by th other.

QUARTO. See BOOK.

QUARTET, a musical composition f four parts, vocal or instrumental, c which each part is essential. It orig inated with Haydn, was developed b Mozart and Beethoven; the latter per fected the art of part-writing. Qs for stringed instruments are writte generally in sonata form, and arrange for viola, violoncello, and two violins Vocal Qs. are a great feature in oper and oratorio works written up to th time of Wagner. Other writers of Qs are Spohr, Schumann, Schubert, Men delssohn, and Brahms.

QUARTZ is silica (SiO_2)*n* crystallize in the hexagonal system; S.G. 2·65 hardness 7. The purest form is roc crystal; impure varieties are milk, rose smoky, and amethystine q.; is a con stituent of granite, etc., and itself form a massive rock; sand and sandstone ar chiefly q. grains. Q. is used for makin spectacle lenses, pivots, balance weights etc. Fused q. is made into fine thread for suspensions, and tubing and labora tory vessels, which stand sudden change of temperature.

QUARTZITE, a sandstone generall found in such ancient rocks as the pr Cambrian.

QUARTZ-PORPHYRY, acid igneou rock containing crystals of quartz an felspar scattered in compact mass o same minerals, and occurring in in trusive lavas. Non-porphyritic varietie are known as felsite; owing to eart movements, many of the q.-p's hav become schistose, especially in Pala ozoic rocks.

QUASSIA, a name given to two di tinct species. Q. *amara* is a tree, nativ of Guiana, with curious winged stalk to the leaves, and large terminal raceme

of bright scarlet flowers, sometimes grown in the stovehouse. The Jamaica Q. (*Picroena excelsa*) yields 'Quassia chips,' extracts of which have many medicinal uses.

QUATERNIONS.—A quaternion is the mutual relation of two *vectors* with respect to *quantity* and *direction*. The sum of a *scalar* and a *vector* is called a quaternion because it involves four independent numbers, such as the scalar and the three coefficients of the vector when that is resolved along three given directions. The quaternion analysis was invented by Sir W. R. Hamilton in 1843.

QUATRE-BRAS. See WATERLOO.

QUATREFAGES DE BREAU, JEAN LOUIS ARMAND DE (1810-92), Fr. naturalist; prof. of Anat. and Ethnology in Natural History Museum, Paris, 1856; expert anthropologist; works include *L'Espece humaine* and *Crania Ethnica*.

QUAY, a landing place built along a line of coast or river banks, or around a harbor with provisions for the moving of vessels.

QUAY, MATTHEW STANLEY (1833-1904), legislator and political organizer; *b.* Dillsbury, Pa.; *d.* Beaver, Pa. He was a lawyer at 22 after graduating from Jefferson College; saw service in the Civil War as a colonel of reserves, and later went into Pennsylvania politics, where he assumed and long held absolute leadership of the State republican organization. Between 1865 and 1885 he served three terms in the legislature, was State secretary and treasurer, and also recorder for the city of Philadelphia. As chairman of the Republican national committee he conducted the successful Harrison presidential campaign of 1888. Elected to the U. S. Senate in 1887, he served until 1899, when his re-election was blocked owing to charges made against him of being a party to the misuse of public funds in connection with the failure of the People's Bank. He was tried and acquitted and later resumed his seat in the Senate, where he remained till his death.

QUAYLE, WILLIAM ALFRED (1860), bishop; *b.* at Parkville, Mo. In 1885 graduated from Baker University. 1886, ordained as Methodist Episcopal minister. At Baker University, as tutor, in 1883-85; adjunct professor of ancient languages, 1886-88; professor Greek, 1888-91, and president from 1890-94; pastor at Kansas City, Mo., 1894-97; Indianapolis, 1897-1900; Kansas City, 1900-04, and at St. James' Church, Chicago, 1904-08. Since 1908 a bishop of the Methodist Episcopal Church. Author of: *Poet's Poet and Other Essays*, 1897; *A Study in Current Social Theories*, 1898; *A Hero and Some Other Folks*, 1899; *The Blessed Life*, 1900; *Books and Life*, 1901; *In God's Out-of-Doors*, 1902; *Eternity in the Heart*, 1904; *The Prairie and the Sea*, 1905; *Lowell and the Christian Faith*, 1906; *God's Calendar*, 1907; *The Book of Ruth*, 1909; *The Song of Songs*, 1910; *The Pastor-Preacher*, 1911; *Laymen in Action*, 1912; *The Climb of God*, 1913; *Poems*, 1914; *Beside Lake Beautiful*, 1914; *Recovered Yesterdays in Literature*, 1916; *The Dynamite of God*, 1918; *The Throne of Grace*, 1919; *Books as a Delight*, 1920; *The Uncommon Common Pace*, 1921.

QUEBEC, eastern prov., Dominion of Canada (45°-62° 40′ N., 59° 7′-79° 40′ W.), lines along lower course of the St. Lawrence R.; surface is generally undulating; drained by St. Lawrence and its tributaries; principal towns are Montreal and Quebec (cap.). Much of surface is forested, and produce is important, Quebec having more than half Canadian production of pulpwood; cereals, flax, fruits, potatoes, and maple products; livestock largely raised; dairy farming carried on; minerals include asbestos, iron, gold, copper, lead, silver, platinum; fisheries are extensive; manufactures cement, textiles, leather, hardware, paper, etc.

Administration is carried out by lieutenant-governor, aided by a responsible ministry and by legislative council and assembly. Quebec sends 24 senators and 65 representatives to the Dominion Parliament. Education is free and nominally obligatory; Montreal, Quebec, and Lennoxville are seats of universities. Inhabitants are mainly of Fr. extraction. Area (since acquisition of Ungava, 1912), 706,834 sq. m.; pop. (exclusive of Ungava) 1921, 2,349,000. For history, see under CANADA.

QUEBEC, cap. of Quebec prov., Canada (46° 48′ N., 71° 13′ W.); founded in 1608 by Fr. traveler, Samuel Champlain; taken by British under Wolfe, who, like Fr. leader, Montcalm, fell during action, 1759; battlefield is now a national park, and there is a monument to Wolfe and Montcalm; great Tercentenary celebrations, 1908; three times cap. of Canada. City consists of Upper and Lower Town, former residential, latter devoted to commerce. Steep streets, deep-eaved Fr. houses, many churches, citadel, and Chateau Frontenac (hotel). Quebec is the seat of a cardinal archbishop, of an Anglican bishop, of Laval R.C. Univ., and of Morrin Coll. Among its principal buildings are Prot.

and R.C. cathedrals, the Parliament House, and the archiepiscopal palace. Excellent harbor and large dry-dock (1,150 ft. long), completed 1918; exports timber, lumber, grain, cattle, cheese, etc.; important railway center; manufactures woolens, hardware, leather goods, etc. The St. Lawrence is crossed at Quebec by a great cantilever bridge (completed 1918) with a span of 1,800 ft. Pop. 1921, 116,850.

QUEBRACHO, a tree growing chiefly in Chile. Its bark is used extensively as a febrifuge and in diseases of the lungs and bronchial tubes. It is called also the white quebracho, to distinguish it from the red quebracho tree which grows in Mexico.

QUEDLINGBURG (51° 47′ N., 11° 7′ E.), town, on Bode, Prussian Saxony; has interesting abbey church; vegetable and flower-seeds; iron and brassware; founded by Henry the Fowler; was long a royal residence. Pop. 27,000.

QUEEN, the wife of a king. The word comes from the Anglo-Saxon cwen, a woman.

QUEEN BEE. See BEE.

QUEEN CHARLOTTE ISLANDS (53° 50′ N., 132° 10′ W.), group, in Pacific, belonging to Brit. Columbia; inhabited by Haida Indians; coal mines.

QUEEN CHARLOTTE SOUND, a strait in the N. Pacific Ocean, dividing Vancouver Is. from the mainland and forming the first of a series of inlets along the N. and E. of the islands.

QUEEN'S COLLEGE. See CAMBRIDGE; DUBLIN.

QUEEN'S COUNTY (52° 58′ N., 7° 25′ W.), county, Leinster, Ireland; generally flat, rising in N. W. to the Slieve Bloom mountains; fertile, interspersed with large tracts of bog; agriculture and dairy-farming; pop. mostly R. C.; capital, Maryborough. Pop. 55,000.

QUEENSBERRY, EARLDOM, MARQUESSATE, AND DUKEDOM OF, Scot. honors. William, Lord Douglas, was cr. earl, 1633; his grandson, William, was cr. marquess, 1682, duke, 1684; marquessate and earldom still remain with Douglases; dukedom, by re-grant, 1706, passed in 1810 to Duke of Buccleuch, descendant of *dau.* of 2nd duke.

QUEENSBERRY, JAMES DOUGLAS 2ND DUKE OF (1662-1711), first Scot. to join William of Orange, 1688.

QUEENSBERRY, JOHN SHOLTO DOUGLAS, 8TH MARQUESS OF (1844-1900), originator of *'Queensberry rules'* for boxers.

QUEENS BOROUGH. See NEW YORK CITY.

QUEENSCLIFF (38° 16′ S., 144° 40′ E.), seaport, watering-place, Victoria, Australia, on Port Phillip Bay.

QUEENSFERRY, SOUTH (55° 59′ N., 3° 23′ W.), seaport, Linlithgowshire, Scotland, on Firth of Forth; connected by ferry and Forth Bridge with North Queensferry (56° 1′ N., 3° 23′ W.), seaport, Fifeshire; near Rosyth Naval Base.

QUEENSLAND, second largest state of Australian Commonwealth (*c.* 10° 40′ S.-29° S., 138°-153° 30′ E.), bounded N. by Gulf of Carpentaria and Torres Strait, N. N. E. by S. Pacific, S. by New South Wales, and W. by S. Australia. Queensland is separated into two areas by Great Dividing Range which follows coast-line at distance of from 100 to 300 m., country between range and coast consisting of alluvial areas and rich river valleys. The Brisbane, Mary, Burnett, Fitzroy, Burdekin and Johnstone rivers are most important of E. watershed, while W. watershed has rivers flowing N. to Gulf of Carpentaria, S. to Murray-Darling system, and W. to S. Australian lakes. Climate varies with latitude and height, N. being tropical and sub-tropical, S. having mean temp of 67° F. Discovery of gold, 1867, led to a great influx of settlers, and prosperity of the state has of recent years greatly increased. Tapping of water beds by artesian wells has been of great service in agriculture and stock raising. Chief towns are Brisbane, Ipswich, and Rockhampton. Charters Towers, Gympie, and Mt. Morgan are important gold mining centers. See MAP AUSTRALASIA.

Queensland has a governor, a legislative council of 49 members appointed by crown, and an assembly of 72 members elected by popular vote. There is adult suffrage for both men and women. Education is gratuitous and obligatory; a univ. of Queensland was founded at Brisbane, 1910. There is no state religion, the principal denominations in order of numerical importance being Anglican, R. C., Presbyterian, Wesleyan, Lutheran. Queensland produces cereals, sugar-cane, wine, cotton, tea, fruits, timber; sheep, cattle, and horses are extensively reared, and form one of chief sources of wealth; and dairy farming is a rapidly expanding industry. Minerals are of great importance, including gold, copper, tin, coal. Industries include manufactures of sugar, tobacco, leather, boots, spirits, flour, machinery, textiles

soap; and meat preserving is largely carried on. Railway mileage exceeds 5,000. The population is more mixed than in any other part of Australia, and includes English, Germans, Chinese, Japanese, Polynesians. Area, c. 670,500 sq. m.; pop. 1921, 757,634.

QUEENSTOWN.—(1) (51° 51′ N., 8° 17′ W.) seaport, County Cork, Ireland; port of call for Atlantic mail steamers. Pop. 9,000. (2) 42° 10′ S., 145° 35′ E.) town, Tasmania, Australia; smelting-works. Pop. 6,000. (3) (31° 53′ S., 26° 52′ E.) town (and division) Cape Province, S. Africa, on Great Kei. Pop. 9,000; division, 33,000.

QUELPART (33° 20′ N., 126° 30′ E.), mountainous, volcanic island; off S. coast of Korea, to which it belongs; fertile; populous. Pop. c. 110,000.

QUENTIN, ST. See ST. QUENTIN.

QUERETARO.—(1) (21° N., 99° 30′ W.) central state, Mexico, on the Anahuac plateau; area, 3,556 sq. miles. Pop. 250,000. (2) (20° 36′ N., 100° 10′ W.) city, capital of above; cotton goods; scene of death of Maximilian of Austria, 1867. Pop. 35,000.

QUERFURT (51° 23′ N., 11° 36′ E.), town, province of Saxony, Prussia, on Querne. Pop. 5,000.

QUESADA Y MATHEUS, JENARO DE (1818-89), 1st Marquis of Miravalles; Span. commander-in-chief; distinguished in Morocco War; put down Carlists and revolutionaries; made minister of war, marquis, and grandee, 1883.

QUESNAY, FRANÇOIS (1694-1774), Fr. court physician and political economist; founded physiocratic school of economics, based on natural law; showed primary importance of agrarian question and true nature of wealth; advocated benevolent despotism, and tax on property.

QUESNEL, PASQUIER (1634-1719), a French Jansenist theologian, joined the French Oratory, 1657. His edition of the works of Leo the Great, 1675, was condemned for Gallicanism, and accordingly placed on the Index, 1676. The Jesuits were always hostile, and had him imprisoned, 1703, but he escaped to Amsterdam, founding there the still existing Jansenist congregation.

QUÉTELET, LAMBERT ADOLPHE JACQUES (1796-1874), Belgian astronomer and meteorologist; *b.* Ghent; app. director, new Royal Observatory, Brussels, 1828.

QUETTA, SHALKOT (30° 10′ N., 67° E.), capital of Brit. Baluchistan N. W. of the Bolan Pass; occupied by a Brit. garrison; strongly fortified; connected with the railway system of India. Pop. 26,000. Quetta district has area 5,130 sq. miles. Pop. 120,000.

QUEVEDO Y VILLEGAS, FRANCISCO GÓMEZ DE (1580-1645), Span. satirist; *b.* at Madrid. His thorough acquaintance with the inner mechanism of court life prompted him to write his great work, the *Politica de Dios*, an attack on Philip IV. and an appeal for juster rule.

QUEZALTENANGO, ancient Xelahuh (14° 51′ N., 91° 35′ W.), town (and department), Guatemala, Central America; textiles. Pop. 29,000.

QUIBERON, BATTLE OF, 1759, episode of Seven Years War. Fr. plan was to unite Brest fleet under Conflans with Toulon fleet under La Clue, and invade England; Boscawen defeated La Clue at Lagos, Aug. 17, while Hawke kept watch off Brest and defeated Conflans in brilliant victory in *Quiberon Bay*, on south coast of Brittany, east of Lorient, on Nov. 20.

QUICHERAT, JULES ÉTIENNE JOSEPH (1814-82), Fr. historian and archivist; director of the École des Chartes; member of Society of Antiquaries; did important archæological work in France, and produced books which are contributions to hist. research and architecture.

QUICK, JOHN HERBERT (1861), author; *b.* in Iowa. Attended the country schools. Taught from 1882-90 and was principal of ward school in Mason City, Iowa. Studied law and admitted to bar in 1889. In 1908-09, associate editor of a weekly in Madison, Wis. Member and counsel of committee that prosecuted boodlers in Sioux City. For term of 1916-24, a member of Federal Farm Loan Bureau, but resigned in 1919 and also served as Mayor of Sioux City, 1898-1900. Author of: *In the Fairyland of America*, 1902; *Aladdin and Company*, 1904; *Double Trouble*, 1905; *The Broken Lance*, 1907; *American Inland Waterways*, 1909; *Virginia of the Air Lanes*, 1909; *Yellowstone Nights*, 1911; *On Board the Good Ship Earth*, 1913; *The Brown Mouse*, 1915; *From War to Peace*, 1919; *The Fairview Idea*, 1919; *Vandemarks Folly*, 1921.

QUICKSILVER. See MERCURY.

QUIETISM, a development of religious life within the Catholic Church in France and elsewhere mainly in the

XVII. cent., though anticipated before and continued since. It was partly due to St. Theresa, whom Quietists followed in her mysticism but not in her devotion to the Church.

QUILIMANE, KILMANE (17° 50′ S., 33° 44′ E.), seaport, Portug. E. Africa, on Quilimane; trade in copra, rubber; unhealthy.

QUILL, technically the lower, hollow, horny portion, or calamus, of a feather, but from this applied to strong flight-feathers themselves, to the pens made from them, to spines like them, such as those of the Porcupine, and to many stalk- or reed-like objects.

QUILLER-COUCH, SIR ARTHUR THOMAS (1863), Eng. novelist and critic; writes under the pseudonym 'Q;' prof. of Eng. literature, Cambridge, 1913; has pub. novels, including *Dead Man's Rock*, 1887; *Troy Town*, 1888; *The Splendid Spur*, 1889, *The Blue Pavilions*, 1891; *The Ship of Stars*, 1899; *Laird's Luck*, 1901; *Hetty Wesley*, 1903; *Fort Amity*, 1904; *The Nayor of Troy*, 1906; *Lady Good-for-Nothing*, 1910; *Brother Copas*, 1911; *Hocken and Hunken*, 1912; *Nicky-Nan, Reservist*, 1915, and *Foe-Farrell*, 1918; has edited several anthologies, including the *Oxford Book of English Verse*; his critical works include *On the Art of Writing*, 1917; *Shakespeare's Workmanship, Studies in Literature*, 1918, and *The Art of Reading*, 1920; in 1897 he completed Stevenson's romance of *St. Ives*.

QUILLOTA (32° 58′ S.; 72° 51′ W.), town, Valparaiso province, Chile, on Aconcagua; copper mines. Pop. 12,000.

QUILON (8° 53′ N., 76° 37′ E.), seaport, Travancore, India. Pop. 16,000.

QUIMPER (48° N., 4° 4′ W.), town, capital of Finistère, France, at confluence of Odet and Steir; ancient capital of Cornouailles; Bp.'s see; XIII.-cent. cathedral; potteries, sardines. Pop. 16,700.

QUIMPERLÉ (47° 53′ N., 3° 32′ W.), town, Finistère, France, at junction of Ellé and Isole. Pop. 7,000.

QUINAULT, PHILIPPE (1635-88), Fr. dramatist; *s.* of Parisian baker; first heard at *Hotel de Rambouillet* in comedy *Les Rivales*, 1653; wrote words for Lully's operas, *Atys*, 1676; *Proserpine*, 1680; *Roland*, etc.

QUINCE (*Pyrus cydonia*), a tree cultivated largely for its fruit, which has an extremely acid flavor. It differs from the apple in the larger number of seeds.

QUINCY, a city of Illinois, in Adam co., of which it is the county seat. It i on the Wabash, the Burlington and th Quincy, Omaha and Kansas City rai roads, and on the Mississippi river. I is an important industrial city and ha flour mills, carriage factories, machin shops, foundries, saw mills, cigar fac tories, tobacco factories, elevator works furniture factories, steam engine works plough works, etc. It is also an im portant commercial city and has steam boat connection with cities along th Mississippi river, which is here crosse by a magnificent railroad bridge. Th city is the seat of St. Francis' Solanu College and Chaddock College. Ther are also several private secondary edu cational institutions. It has a Stat Soldiers' and Sailors' Home and severa hospitals. It is the residence of Protestant Episcopal bishop. There ar public libraries and parks. Pop. 192 35,978.

QUINCY, a city of Massachusetts, Norfolk co. It is on the New York New Haven and Hartford railroad an at the mouth of the Quincy River, a its entrance to Quincy Bay. Include within its limits are nearly a doze villages. Its chief industry is granit quarrying and the manufacture of boot and shoes. The famous Quincy granit which is used in all parts of the Unite States is quarried here. There are severa well known educational institutions, in cluding the Adams Academy for Boy and the Woodward Institute for Girls There is a public library and a cit hospital. Quincy was the birthplace o John Hancock, John Adams, Joh Quincy Adams and other members o the famous Adams family who for severa generations made the city their residenc place. Pop. 1920, 47,611.

QUINCY, JOSIAH (1744-75), lawye and Revolutionary leader; *b.* Boston Mass.; *d.* at sea. He studied at Har vard, became a lawyer and develope an extensive practice. He was one o the pioneers of the Revolutionary move ment and by his eloquence and writing swayed the country towards inde pendence in the declining colonial era Yet in 1770, when anti-British feelin in Massachusetts was inflamed by th Boston Massacre, he defended wit John Adams and obtained the acquitta of the British soldiers charged with tha crime. A pamphlet he wrote in 1774 wa a virtual defiance of British rule in i implied advocacy of armed resistanc He visited England the same year an died on the return voyage.

QUINCY, JOSIAH (1772-1864), law yer and president of Harvard Colleg

b. Boston; *s.* of Josiah Quincy, 1744-75. After graduation from Harvard in 1790 he practiced law and between 1806 and 1813 sat as a federalist in Congress. For 9 years after, he was a member of the state legislature, then served as judge of the Boston municipal court, also mayor of that city, 1823-29, and was president of Harvard College from 1829 to 1845. He became one of the most prominent orators of his time and was among the first northern leaders to denounce slavery. As a judge he advanced the then novel legal doctrine that the publication of truth in good faith and for a good end was not libel.

QUINET, EDGAR (1803-75), Fr. historian; prof. at Collège de France; wrote about poetry, history, religion, and travels; style recalls Chateaubriand by its vivid color; inclined towards democracy and pantheism, and was deprived of chair. He tried, without much success, epic poem in *Napoleon* and again in *Promethee*; afterwards wrote much-admired *Ahasverus* in poetical prose.

QUININE, $C_{20}H_{24}N_2O_2$, the chief alkaloid in cinchona bark (from Peru, Jamaica, India, etc.), was first prepared by Pelletier and Caventou in 1820. It is extracted by dilute sulphuric acid, and separated from cinchonine and numerous other alkaloids by fractional crystallization of the sulphate. Q. (M.P., anhydrous, 177°) crystallizes with $3H_2O$; its chief salts are the sulphate, $(C_{20}H_{24}N_2O_2)_2$, H_2SO_4, $8H_2O$, and dihydrochloride, $C_{20}H_{24}N_2O_2$, $2HCl$, $3H_2O$. Solutions of salts have an intensely bitter taste, and give an emerald green color with chlorine or bromine water and ammonia; dilute solutions show a light blue fluorescence. A valuable tonic and antipyretic, and an antidote to malaria.

QUINN, ARTHUR HOBSON (1875), university dean; *b.* at Philadelphia, Pa. Graduated from University of Pennsylvania in 1894. At University of Pennsylvania as instructor of Mathematics, 1894-95, English, 1895-1904, assistant professor of English, 1904-08, professor since 1908, dean of college faculty since 1912, and director of the summer school, 1904-07. Author of: *Pennsylvania Stories*, 1899; *The Early Drama* (in Cambridge History of American Literature), 1917. Editor (with introductions and notes): *George Eliot's Silas Marner*, 1900; *The Faire Maide of Bristow* (reprint from quarto of 1605), 1902; *Representative American Plays*, 1917; *Emerson Essays*, 1920; *Mark Twain's Prince and Pauper*, 1921.

QUINOLINE, C_9H_7N, a basic compound of double ring structure, like napthalene, but with one of the CH groups in the *a*—position replaced by a nitrogen atom. Quinoline occurs in coal tar and bone oil, but is best prepared synthetically by heating aniline, nitrobenzene, and glycerol with sulphuric acid. It is a colorless liquid (sp. gr. 1·09) with a strong smell, boiling at 239° C. It forms salts, and is the parent substance of a number of dye-stuffs.

QUINONES are benzene (or anthracene) derivatives containing two CO groups. Quinone consists of yellow needles, M.P. 116°, formed by oxidation of aniline, or hydroquinone.

QUINQUAGESIMA, the Sunday before Lent, because fifty days before Easter.

QUINSY, popular name for acute tonsilitis.

QUINT, WILDER DWIGHT ('DWIGHT TILTON') (1863), journalist, author; *b.* at Salem, Mass. In 1887 graduated from Dartmouth College and in the same year started working on a Boston newspaper. Was night editor on different papers until 1892. On another paper until 1903 as literary, telegraph and managing editor. In 1903-07 editorial writer and dramatic and musical critic on a Boston Journal. Joint author: *Miss Petticoats*, 1902; *On Satan's Mount*, 1903; *My Lady Laughter*, 1904; *Letters of a Son to His Self-Made Father*, 1903; *A Self-Made Man's Wife—Her Letters to Her Son*, 1905; *The Golden Greyhound*, 1906; *Meyer and Son*, 1908; author of: *The Story of Dartmouth*, 1914. Wrote short stories for various magazines.

QUINTAIN, instrument formerly used in tilting; post with movable cross-bar having board at one end and a bag of sand at the other; horsemen aimed at board, and quickly got out of range of sandbag which swung round.

QUINTAL (connected with Lat. *centum*, 100), a weight used in Spain, Italy, Portugal, and Argentina. It equals 100 libras, but as these vary somewhat it is equivalent in Spain and Portugal to 101·4 lbs., and in the Argentina to 101·27 lbs. The old French Q. was equal to 100 livres (108 lbs.), and the metrical Q. is 100 kilograms (220·49 lbs.).

QUINTANA, MANUEL JOSÈ (1772-1857), surnamed the 'Spanish Tyrtæus,' a Spanish author, *b* at Madrid. He did much for the cause of liberty, was the editor of *Semenario Patriotico*, and author of the manifestoes of the insurrectionary juntos. Besides his Spanish Plutarch (*Vidas los Espanoles Celebres*,

1807-34), he published one or two tragedies and an excellent selection of Castilian poetry (*Poesias Selectas Castillanas*, 1808).

QUINTESSENCE, the fifth element, the substance of the heavenly bodies (Aristotle).

QUINTET, a musical composition, written for five parts, vocal or instrumental, in which each part is essential to the perfect rendering of the whole work. Of vocal quintets, one of the most famous is that which occurs in Wagner's Meistersinger. Quintets for stringed instruments have been composed by Mendelssohn, Schubert, Beethoven, and others, while quintets for other instruments have been written by Mozart, Raff, Brahms, Schumann, and Schubert.

QUINTILIAN, MARCUS FABIUS QUINTILIANUS (*c.* 35-95 A. D.), Rom. rhetorician; *b.* Calagurris, Spain; ed. Rome; became distinguished pleader; instructed younger Pliny; favored by Vespasian. His chief work is *Institutiones Oratoriae* (commonly called *The Institutes*), a complete system of rhetoric dedicated to Marcellus Victorius; style clean and pure in spite of Silver-Age idioms; spurious works ascribed to him, such as *Declamationes* and *De oratoribus*. See RHETORIC.

QUIRE, twenty-four sheets of paper. Twenty quires make one ream.

QUIRINAL, one of the seven hills in ancient Rome. See ROME.

QUIRINUS. See ROMULUS AND REMUS.

QUITO (0° 14′ S.; 78° 50′ W.), capital, Ecuador, S. America, on a plateau of the Andes; seat of an abp.; cathedral; numerous churches and convents; astronomical observatory and univ.; cot tons, woolens; ancient capital of Incas taken by the Spaniards, 1534. Pop 70,000.

QUO WARRANTO, writ demandin by what warrant a person holds an offic abused by Charles II. and James II in depriving cities of their rights; b Judicature Act, 1884, Q. W. is a civi proceeding.

QUOITS, a popular game. The quoi is a direct descendant of the Roma *discus*, a ring of iron or stone from 10 t 12 in. in diameter. The modern quoi is an iron ring averaging 6 lb. in weight flattish in shape, but convex on the uppe side to form sufficient edge for the quoi to stick in the ground when falling. Th ring is about 2½ in. broad and 9 in. i diameter, with a hollow dint on the oute rim for the forefinger or the thumb Two 'hobs', or pins, are placed in th ground, generally 19 yds. apart, and th players endeavor to ring the 'hob', o pin, or to place their quoit as near it a possible.

QUORUM. In law, a justice of th peace is said to be of the Q. when th commission appointing him expresse that he is one of those whose presenc is necessary to constitute a bench, a at quarter sessions. The term Q. i this context is derived from the word in the Latin form of the commission 'Quorum unum A. B. esse volumus ('Of whom we will that A. B. be one') Hence by analogy, in any assembly committee, etc., when it is necessar that a certain number of officers o members should be present to giv validity to its acts, that number i generally said to constitute a Q.

QUORRA, part of Upper Niger.

R

R, 18th letter of alphabet; originally a picture of a lion; in modern English nearly silent, as in *girl, bird.*

RAAB, Hungarian Györ (47° 41′ N., 17° 40′ E.), town, on Raab, Hungary; occupies site of Rom. *Arrabona*; formerly fortified; XII.-cent. cathedral; manufactures machinery, agricultural implements; trade in grain, horses. Pop. 1920, 50,035.

RABAT (34° N., 6° 20′ E.), seaport, Morocco, at mouth of Bu Regreg; manufactures carpets; exports wool and hides. Pop. 1920, 29,600.

RABBI (Hebrew 'teacher'), Jewish title first given to Gamaliel; now a teacher of the young, rather than a priest.

RABBIT (*Lepus* (*Oryctola*)*gus cuniculus*), relative of Hare, with smaller body, shorter ears, and characteristic habit of burrowing; found widely distributed in Old World, probably often through man's introduction, as in Australia and New Zealand. Unlike those of the Hare, its young are naked and helpless at birth.

RABELAIS, FRANÇOIS (*c.* 1483-1553), Fr. writer; *b.* in Chinon; soon showed his love for science; studied Gk. and Lat. authors, natural history, law, math's, and professed med. at the Univ's of Montpelier, 1530, Lyons, 1532; made remarkable anatomical discoveries; pub. two editions on Galen and Hippocrates; member of chief literary circle; went to Rome as medical adviser of Jean du Bellay, 1533. R. published *Pantagruel*, 1553, *Gargantua*, c. 1535 (et seq.); his other writings are of no intrinsic interest. He enjoyed the curacy of Meudon, 1550-52. Those who knew him well called him a sober, estimable, and learned man. *Gargantua* and his fellows are giants performing the most extraordinary feats, lovers of pleasure and good cheer.

RABIES. See **HYDROPHOBIA.**

RACALMOTO, a town of Sicily in the province of Girgenti. It has mines of sulphur, salt and quicksilver. Pop. about 20,000.

RACCOON DOG. See Dog Family.

RACCOON FAMILY (*Procyonidae*), a family of Carnivores whose members have clumsy bodies, short necks, and sharp muzzles. They include the carnivorous Raccoons (*Procyon*) of America, the beaver-like fur of which is much used by man; the vegetarian Panda (*Ailurus*) found in the Himalayas above an altitude of 7,000 feet; and the Coati and Kinkajou.

RACE, CAPE. See Newfoundland.

RACHEL, ELISA (1821-58), Fr. actress; from 1838 onwards enjoyed phenomenal popularity in tragic parts such as Phèdre. *Adrienne Lecouvreur* was written specially for her.

RACHMANINOV, SERGEI V. (1873), Russian pianist and composer; *b.* province of Novgorod. He studied music at the Petrograd Conservatory as a child and later at the Moscow Conservatory, from which he graduated in 1893, signalizing his graduation by producing his first opera *Alelso.* For ten years he taught at the Moscow Girls' Institute and was conductor at the Moscow Imperial Theatre from 1904 to 1906. Later he gave recitals in Europe and America and after touring for several years devoted his genius to creative work as a resident of Dresden. His work includes two other operas, *The Niggardly Knight* and *Francesca di Rimini*, a symphonic poem, *The Isle of Death*, a number of cantatas, and much piano music.

RACINE, a city of Wisconsin, in Racine co., of which it is the county seat. It is on the Chicago, Milwaukee and St. Paul, and the Chicago and Northwestern railroads, and on Lake Michigan, at the mouth of Root river. It has one of the best harbors on the lake and vessels drawing 14 feet of water are accommodated. Its industries include the manufacture of agricultural implements, carriages, leather, iron castings, lumber, etc. It is the seat of Lutheran College,

Racine College, Racine Academy, St. Catherine's Academy, and other educational institutions. There is an orphan asylum and a hospital. Pop. 1920, 58,593.

RACINE, JEAN (1639-99), Fr. dramatist; *b.* at La Ferté-Milon; ed. first at the coll. of Beauvais, then at Port-Royal. Verses on the king's marriage, 1660, and convalescence, 1663, won for him a pension and began his fame. *La Thebaide*, 1664, his first tragedy, and *Alexandre le Grand*, 1665, recalled the style of Corneille. His masterpieces are *Andromaque*, 1667; *Britannicus*, 1669; *Berenice*, 1670; *Bajazet*, 1672; *Mithridate*, 1673; *Iphigenie*, 1674; *Phedre*, 1677. R. had a perfect knowledge of Greek. His characters are true, and their passions are finely depicted, though his plays have preserved the manners and language of Louis XIV.'s court. *Les Plaideurs*, 1668, imitated from Aristophanes' *Wasps*, is an amusing satire on the judges, advocates, and pleaders of his time, written in exquisite verses.

RACING.—Horse-racing was a highly credited sport among the ancient Greeks. There is mention of chariot-racing in Homer, and Pindar bestows on the subject the tribute of highest poetry. But in the modern sport the horses run single and are mounted. In Britain, Newmarket and Epsom are the oldest courses, dating from the time of James I. It was not, however, till the closing decades of the XIX. cent. that the turf became an object of universal interest.

Meetings on the Continent are popular. The interest taken in the sport in the Brit. colonies, especially Australia and New Zealand, is intense. Steeplechasing was originally a race of hunting horses which tested both speed and jumping, and was run from one church steeple to another. The first mention of the sport is of a steeplechase match in Ireland in 1752, and in Ireland today the sport is still much more cultivated than in Great Britain. The most important steeplechase is the Grand National, run in March at Aintree, a suburb of Liverpool. The most important race is the Derby, run at Epsom.

In U. S. A., racing dates from the XVII. cent., but first Jockey Club was at Charleston, 1735. Thoroughbred stock has been much imported; but trotting races, where time is supreme test, excel in interest. National Trotting Association was founded, 1869, and since then trotting prizes have grown enormously.

RACK. See TORTURE.

RACKETS, RACQUETS, wall-game, somewhat similar to Fives, except that it is played with a racquet and not with gloved hand. The modern form of the game came into force some sixty years ago when the four-walled enclosure superseded the back- or one-walled court. Dickens paints an interesting picture of the debtors playing r. in the Fleet, but we can find no account of it before the XIX. cent.

RACKHAM, ARTHUR (1867), Brit. artist and illustrator; associate, Société Nationale des Beaux Arts, Paris, 1912. Illustrated *Rip Van Winkle*, 1905; *Peter Pan*, 1906; *Undine*, 1909; *Mother Goose*, 1913; *English Fairy Tales*, 1918; *Cinderella*, 1919; *The Sleeping Beauty*, 1920; *Cornus*, 1921; *Hawthorne's Wonder barge*, 1922, etc.

RADAUTZ (47° 50′ N., 28° 54′ E.), town, Bukovina. Pop. 16,000.

RADCLIFFE (53° 33′ N., 2° 19′ W.), town, Lancashire, England; cotton. Pop. 26,000.

RADCLIFFE, MRS. ANN (1764-1823), Eng. novelist; writer of mysteries —secret passages, etc.; works include *A Sicilian Romance*, 1790; *Mysteries of Udolpho*, 1795; *The Italian*, 1797.

RADCLIFFE COLLEGE, a seat of learning for women, situated in Cambridge, Mass., was formed in 1879 to provide instruction for women by Harvard professors. In 1894 it received its present name in recognition of the gift of Anne Radcliffe to the university with which it also became affiliated in that year. Its courses and diplomas are virtually those of Harvard. In 1922 it had a student roll of 662, and a teaching staff of 162, directed by L. Baron Russell Briggs of Harvard, president since 1903.

RADCLIFFE, JOHN (1650-1714), Eng. physician; ed. Oxford; he founded two medical traveling fellowships in Univ. Coll., Oxford, and his executors also built the Radcliffe Observatory, Hospital, and Library at Oxford, and enlarged St. Bartholomew's Hospital, London.

RADEBERG (51° 10′ N., 13° 55′ E.), town, Saxony, on Röder; manufactures glass. Pop. 13,000.

RADETZKY COUNT, JOHANN JOSEF WENNEL ANTON FRANZ KARL (1766-1858), Austrian general, distinguished in Napoleonic invasions, helped to reorganize army; commander-in-chief of army of Italy, 1831; won high praise in campaigns, 1834; field-marshal, 1836; evacuated Milan, 1848, but skilfully held Sardinians in check, and

restored Austrian rule, 1849.

RADEVORMWALD (51° 12′ N., 7° 30′ E.), town, Rhineland, Prussia; hardware manufactures. Pop. 11,000.

RADHANPUR (23° 49′ N., 71° 39′ E.), native state, Bombay, India. Pop. 62,000. Capital, Radhanpur. Pop. 11,500.

RADIATION is the term applied to the stream of energy which, in one form or another, can be emitted by a body, transmitted through the luminiferous medium or ether, and absorbed by another body. It may take a form which can affect the optic nerve, and we then know it as Light. It may also produce an appreciable rise of temperature in a body which absorbs it, and we then call it radiant heat. It may take the form of electro-magnetic waves, such as are used in wireless telegraphy, and it is then termed Hertzian radiation. These are not distinct forms; they are only aspects of the same phenomenon which differ in respect of one common quality—(*viz.*,) wave-length. The properties of radiation may be most clearly understood by reference to the two forms familiar in all experience, and with these we shall deal here. That radiant heat and light are identical in nature may be readily believed. They travel through space with the same speed, are reflected and refracted according to the same laws, and their intensity diminishes with distance according to the same law of the inverse square. We have, therefore, every reason for the belief that radiant heat, as well as light, is due to an undulatory motion in the ether.

RADICAL, in Brit. politics, the name given to advanced section of Liberal Party. Term first used in 1818.

RADICAL, OR RADICLE. See CHEMISTRY.

RADIOACTIVITY. The discovery in 1895 of the Röntgen rays led physicists to examine those substances which are phosphorescent after exposure to light in order to ascertain whether they gave out rays with properties similar to the Röntgen rays. While so engaged, Becquerel discovered in 1896 that the double sulphate of potassium and uranium emitted rays which affected a photographic plate when wrapped in black paper, and also ascertained that all compounds of *uranium* possessed this property. But further investigation showed that *pitchblende* (the mineral from which uranium is extracted) was more active in the above respect than could be accounted for by its uranium content, and this led to the belief that the action of uranium was due to some substance, present in minute quantity in uranium, to which the phenomenon was due. Monsieur and Madame Curie undertook the search for this substance, and after most laborious work extracted from pitchblende ore two new elements, *polonium* and *radium*. These elements are present in excessively minute quantities in the ore, several tons of which are required in order to supply a few grains of radium. The activity of the radium was found to be more than a million times that of uranium, and it is the principal radioactive substance known. It emits rays which can pass through metal and other substances which are opaque to ordinary light, can affect a photographic plate, can discharge the electricity of an electrified body, and can cause phosphorescence in bodies exposed to them. All this it does *spontaneously*; that is, external agencies, such as heat, pressure, etc., have no influence in altering the emission of the rays. Any substance which emits rays in this manner is said to be *radioactive*.

The rays emitted by radium are of three distinct kinds, known as the *α*, *B*, and *Y* rays. The distinction between them can be demonstrated in various ways, but that which will be most readily understood is the action of a magnet. Suppose a small quantity of radium be placed at the bottom of a short cylindrical leaden tube, standing vertically, and that a strong magnetic force be made to act horizontally on the rays as they emerge from the upper end of the tube. It is then found that the *α* rays are very slightly deviated to one side of the vertical, the *B* rays are strongly deviated to the other side so as to describe circular paths, while the *Y* rays proceed vertically upwards without deviation. This difference in behavior is connected with the fact that the *α* rays consist of positively charged corpuscles, the *B* rays are exactly similar to *kathode* rays, and therefore consist of negatively charged corpuscles, or electrons, while the *Y* rays are in reality Röntgen rays. They also differ in their power of penetrating metals. Roughly speaking, if the power in this respect of the *α* rays be represented by 1, that of the *B* rays is 100, and that of the *Y* rays is 10,000. The speed of the *α* rays is about one-fifteenth that of light—(*i.e.*) about 12,500 miles per second; that of the *B* and *Y* rays is nearly that of light.

In addition to these rays, radium also evolves a considerable quantity of *heat*. In one hour the amount evolved from a given weight of radium is sufficient to raise an equal weight of water from the freezing-point to the boiling-point. Lastly, there is given off a gaseous ema-

nation which is itself radioactive. But the most interesting feature of radium is revealed when we study the later history of these rays and consider what is left behind after their emission. The facts may be briefly summarized as follows: The changes exhibited by radium form only a few of the stages in the process of atomic disintegration which, beginning with uranium, finally ends in lead. The atom of uranium first loses three α particles, and radium is produced. These particles form what is known as *helium*, a gas which is found in ores containing uranium. The α particle is known to carry two atomic charges of electricity, and its atomic weight is therefore 4, which is also the atomic weight of helium. Now the atomic weight of uranium is 238 (approximately), and if we subtract from this the equivalent of three helium atoms—(*i.e.*) 12—we get 226, which is the atomic weight of radium. Next, the radium atom passes through several further stages, including polonium, and in the course of these it loses four α particles. This would leave behind an element whose atomic weight would be 16 less than 226, and the atomic weight of *polonium* is, in all probability, very close to this figure. Again, the loss of one α particle by polonium would result in lead, whose atomic weight is 206.

No general theory of atomic structure has as yet been worked out which will fully account for this process of disintegration or explain the conditions in which a radioactive substance emits electrically charged particles. But the tendency is to suppose that the electrons constituting an atom are in a state of rapid vibration of circulation about the center of the atomic system; that they are therefore subject to accelerative forces, and consequently radiate energy; that when this energy loss has become considerable the system becomes unstable, and a B particle is expelled, this expulsion producing the pulsational disturbance in the ether which we know as the Y ray or Röntgen ray. The α particles are expelled in proportion to the B particles.

In addition to uranium, radium, and polonium, other elements exhibit radioactive properties. Among these may be mentioned *thorium* and *actinium*. There is also reason to believe that all metals are more or less radioactive. Evidence has been obtained of the almost universal presence of radium in the earth's crust and in the atmosphere, and it is believed that the total quantity present is sufficient to account for the present temperature of the earth.

RADIOLARIA, sub-class of the Sarcodina group of Protozoa, microscopically minute animals with a bod which may be globular, disc-like, c elongated, but from which the flesh streams in long, fine, radiating thread or pseudopodia (hence the name 'Radio laria'). These threads never form a net work. R. are further characterize by the presence of a membranous 'centra capsule.' Almost all are furnished wit skeletons, generally composed of silic and these are structures of wonderfu complexity and beauty.

RADIOGRAPH. See VACUUM TUBE

RADIOMETER, an instrument in vented by Sir W. Crookes to show th effect of a rarefied gas on unequall heated surfaces. It consists of four sma disks of mica mounted on the ends o arms, which project radially from a vertical rod. This rod is pivoted at to and bottom so that it can rotate upo its own axis. Each disk is coated wit lampblack on one face, and the blackene faces are so arranged that when the ro rotates all the disks have either the blackened faces in front and their non blackened faces behind, or *vice versa* The system of disks, projecting arms, an rod are mounted within a glass bulb, i which the air pressure has been reduce to a very low amount, and the whole i placed on a suitable stand. When th instrument is exposed to radiation fro any source (*e.g.*, a ray of sunlight) th arms revolve.

RADIO STATION. The buildin together with its attendant apparatu aerial, counterpoise, and ground sys tems used for the transmission an receiving of radio communications known by this name. Receiving station are not usually classed as radio station Stations are classified according to the use and operation as: governmen stations; radio compass stations; com mercial stations; amateur station broadcasting stations, etc. They ar further classified according to the kin of wave they produce, thus: spark station (damped wave); C. W. (con tinuous wave); I. C. W. (interrupte continuous wave); etc. A furthe classification differentiates according t the wave length they are permitted t employ.

RADIO (WIRELESS) TELEPHONY is the science of transmitting speech music, etc., by means of the electro magnetic disturbances of the 'ether known as wireless waves. Many phase of its development are closely relate to radio telegraphy. The original ide of the possibility of speech transmissio by radio had its inception in 1899 Fessenden at this time was experiment ing with the Wehnelt interrupter of a

induction (spark) coil, which he was using for wireless telegraph transmission. Its high pitched musical note impressed this brilliant investigator and he realized that if the pitch were so high as to be inaudible he could use his apparatus to transmit speech. Professor Kintner and Mr. Brashear, his assistants, started the construction of an apparatus to produce 10,000 sparks per second. This they completed in the fall of 1900, and after much experimenting, transmitted speech for a distance of one mile. The transmission could not be considered good as it was accompanied by loud extraneous noise, caused by variations in the spark.

In 1903 the electric arc was used to replace the spark coil. This also proved too noisy to be practicable. In 1904-5 a high frequency alternator was designed to deliver a 10,000 cycle per second note, and was tried out as a radio phone transmitter. The design, however, was faulty, but in 1906 an improved machine, the design of Steinmetz, Haskins, Alexanderson and others, was perfected. This, with a frequency of 50,000 cycles per second and a capacity of 1 kilowatt was successfully used to transmit speech from Brant Rock to Plymouth, a distance of 11 miles. Moreover, the transmission was pronounced more perfect than was possible with wires. In 1907 the U. S. Navy equipped about twenty ships with radio phone sets for interfleet communication, using the arc method. In the same year Dr. de Forest broadcasted music in New York City. However, this was an experiment merely, and lasted but a short time. The results of the yacht races on the Great Lakes in the fall of this year were announced by wireless phone, phonograph music between announcements being supplied to entertain the listeners. Some of the 1908-9 performances of the Metropolitan Opera House, New York City, were broadcast from a station on the roof of the building. Microphones placed near the footlights served to pick up the music. At this time, Mme. Mazarin, the first artist to sing for the wireless phone exclusively, was heard from de Forest's laboratory in New York City. Much research work and many tests were made in the years following the pioneer work which had been done by Marconi, Fessenden, Duddell, Poulsen and many others, but it was not until about 1915 that practical and commercial use was made of radio telephony. The classical experiment of the American Telephone and Telegraph Co., when speech was transmitted from the naval station at Arlington, Va., to Panama, Mare Island, Cal., Honolulu, Colon and Paris, by means of their 'audion' (vacuum tube) apparatus, occurred in 1915. In the fall of 1916 musical programs were transmitted from High Bridge, N. Y. These, however, were more experimental than practical as their reception was confined to a limited number of amateurs and ship radio stations.

Much developmental work was done by the various governments during the World War with a view to using the system as a means of communication between aeroplanes and airdromes, submarines, trenches, etc. Little of this, however, was made public until after the war. It is interesting to note that the French in 1918 were using sets with a 30 mile range on their aeroplanes. Sept. 1, 1920, marked the inauguration of the 'Detroit News Wireless Service' by the newspaper of that name. Its purpose was to broadcast news and music to listeners in the vicinity. Soon afterward, orchestral music was regularly broadcast from the California Theatre, San Francisco. The Westinghouse Electric and Manufacturing Co.'s stations at Pittsburg, Pa., and Newark, N. J., followed. These were the pioneers among the numerous broadcasting stations now in operation in this country. The 595 stations licensed to broadcast at the present writing interfere with each other to such an extent that the Federal Government has been forced to revise their allotment of transmitting wave lengths and to restrict the hours during which amateur stations are permitted to operate. The broadcasting stations are restricted to certain wave lengths and are permitted to transmit only at certain hours. These stations are licensed only to broadcast, and cannot be a party to two way communication.

There are three essentials necessary for the transmission and reception of speech and music by radio waves. They are: 1. A means for radiating a stream of continuous electro-magnetic waves. 2. A means for modulating this stream in accordance with the sound waves, (*i.e.*,) changing the waves by superimposing on them the electric waves produced by the sound waves on the microphone. 3. A continuously responsive receiver capable of giving indications proportional in magnitude to the energy received, and capable also of responding with sufficient rapidity to speech harmonics.

As noted above in the brief history of radio telephony, diverse methods have been used for the production of radio frequency waves. Induction coils with high speed interrupters and arcs of various kinds have been found wanting in quietness of operation and have been

discarded. The high frequency alternators of Alexanderson, Goldschmidt, Jolly and others have been used successfully, but the present vacuum tube with its ease of control and small size are replacing the alternators and frequency step-up transformer systems. The three element type of vacuum tube, known also as the audion, pilotron and triode, consists of a glass tube, devoid of air or gas, and containing a filament of some metal such as tungsten, surrounded by a 'plate' of nickel. Between the filament and the plate is interposed a 'grid' of nickel wire. When the filament is heated by the passage of an electric current, a stream of electrons is emitted from it and pass through the grid to the plate. When the grid is negatively charged, it repels the electrons emitted and prevents their reaching the plate; thus if the grid be connected to an alternating current, the electron stream will be periodically interrupted, and the current in a circuit composed of the plate and the filament will vary accordingly. Under these conditions the tube is said to oscillate, and is known as a separately excited oscillator. If, now a portion of the output of the plate circuit is induced in the grid circuit, the tube will continue to oscillate (produce an alternating current) the frequency of oscillation being dependent on the constants (inductance, resistance and capacity) of the circuits. By properly proportioning these constants, any frequency from a fraction of a cycle per minute to many million cycles per seconds can be produced. The energy represented by the output of an oscillating triode comes partly from the power used to heat the filament and partly from a source of high voltage direct current inserted in the plate circuit. This D. C. voltage is sometimes as high as 20,000 volts, and may be produced by storage batteries, high voltage generators or rectifiers. There are various methods of modulation in use, all accomplishing the same result by different methods. The purpose of the modulator is to vary the voltage of the oscillator circuit (thus varying the amplitude of the waves generated and radiated) in accordance with the sound waves to be transmitted. In this respect their duty is much the same as the transmitter in wire telephony.

The radiating systems now in use for the transmission of speech on waves from approximately 250 to 600 meters length usually consists of a relatively short elevated aerial or antenna, an insulated counterpoise and the necessary ground connection.

The broadcasting station of today uses especially designed and constructed studios in which the music or othe entertainment is produced. Variou microphones are used, depending upo the quality of the music, range of th singer's voice, etc. Wires are used t connect the station with theatres, con cert halls, etc., from which performance are transmitted. If the acoustic prop erties of the theatre or the placing of th microphones is not quite right, distortio or accentuation of one instrument o tone will result. The very low and th very high notes of the pipe organ wi not reproduce properly in the ordinar receiving set, and for this reason selec tions requiring only about half the orga range are chosen for broadcasting.

The prime requisites of a receiver fo radio telephony are: (A) A means fo tuning the receiving circuit so that it fundamental wave length is the same a that of the transmitter. This is accom plished by varying the inductance o capacity of the circuit which include the aerial and ground. (B) A means o detecting or rectifying the received wave this may be done by a crystal (such a galena, silicon, etc.) or by a diode (tw element vacuum tube) or a triode (thre element vacuum tube). (C) A means o rendering the rectified signal audibl such as a telephone receiver.

A complete discussion of the variou types of receivers cannot be given her as there are literally hundreds of cir cuits in use. The signals may be am plified either before or after passing th detector. The former method increase the range, while the latter increases th volume. Some circuits permit amplifica tion and detection to go on simu taneously in the same triode, thus per mitting one vacuum tube to do the wor of several. See BROADCASTING.

RADIOTHERAPHY. The treatmen of disease with ultra-violet rays, X-ray and radium rays. In its narrowest sens the term includes only treatment wit X-rays, the use of radium and othe radio-active substances being sometime given the special name of radiumtherapy Ultra-violet rays are used in the treat ment of lupus and of tuberculosis Three varieties of X-rays are employe in medicine, known as 'soft,' 'mediun and 'hard,' the difference consisting i variation in wave length and power o penetration. The rays are used for th treatment of ringworm, and variou malignant growths. Radio-active sub stances, chiefly radium itself, are used i a variety of ways. Sometimes th emanations are absorbed in vaselin oils, or water and applied externally; o a copper plate is coated with a varnis containing radio-active substances, th plate being then applied to the pa

affected; or a small tube containing radioactive matter is buried in the tissues; or a gold needle, its tip containing radioactive matter, is plunged into the growth undergoing treatment. Cancer, rodent ulcers, birth-marks, and various malignant growths are treated with radium and considerable success has been met with, the results sometimes being astonishingly good. In some cases, a combination of X-rays and radium is employed.

RADIO TRANSFORMERS. See TRANSFORMERS, RADIO.

RADIO WAVES. This term is popularly applied to the electromagnetic disturbances of the 'ether' created by the electromagnetic energy output of a radio transmitter. Radio waves are propagated through the 'ether' at the speed of light (186,000 miles per second), and may vary in frequency from 15,000 to 5,000,000 cycles per minute. They may be either sustained or damped, according to the method used for their production. Sustained waves have a constant amplitude and are used for radio telegraph and telephone communication. The amplitude of a damped wave train decreases from a maximum to zero at a certain rate known as its decrement. These find their principal use in radio telegraphy.

RADISH (*Raphanus sativus*), a cruciferous biennial which stores food in the root. This has a pungent taste, and is used in salads.

RADIUM (Ra=226), a chemical element obtained from pitchblende uranium ore. It is the most radioactive substance known, is phosphorescent, and a given quantity of it emits sufficient energy in an hour to raise the temperature of an equal quantity of water from the freezing to the boiling point. It disintegrates in process of time and produces helium. See RADIOACTIVITY, HELIUM.

RADNOR, EARLDOM OF COUNTY OF, Eng. honor; cr. 1679 for John Lord Robartes, field-marshal for Parliament, 1644; extinct, 1757. William, Lord Folkestone, was cr. earl, 1756; since held by his descendants, Plevdell-Bouveries.

RADNORSHIRE (52° 16′ N., 3° 15′ W.°) county, S. Wales, bordering on Montgomery, Shropshire, Hereford, Brecon, and Cardigan; area, *c.* 470 sq. miles; drained by Wye and Teme, which form parts of S. W. and N. E. boundaries respectively, and by other streams; capital, New Radnor. excellent fishing in the rivers. Pop. 1921, 23,528.

RADOM (51° 20′ N., 21° 10′ E.), government, Russ. Poland, bordering Austrian Galicia; drained by the Vistula; hilly and wooded in S.; fertile in center; low marshy plains in N.; chief crops wheat, rye, barley; important iron industry; flour-mills, distilleries. Pop 1,080,800. Capital, Radom, has pop. 1921, 61,627.

RADOMYSL (51° 15′ N., 29° 10′ E.), town, Kiev, Russia, on Teterev; tanneries. Pop. 12,200.

RAE BARELI (26° 14′ N., 81° 16′ E.), district, Lucknow division, United Provinces, India. Pop. 1,040,000. Capital, Rae Bareli, pop. 16,000.

RAEBURN, SIR HENRY (1756-1823), Scot. portrait painter; *b.* in Edinburgh; received some training and practiced his art there; went for study to Italy for two years; returned and settled in Edinburgh in 1787.

RAEMAEKERS, LOUIS (1869), Dutch cartoonist; was director of an art school in Gelderland; painted chiefly portraits and landscapes; became a cartoonist, 1908. His war cartoons achieved a wide celebrity, an exhibition of them being held in London, 1915; has pub. *The Great War in 1916*, *The Great War in 1917*, *Devant l' Historie*, 1918, and *Cartoon History of the War*, 1919.

RAFF, JOSEPH JOACHIM (1822-82), Ger. composer. A prolific writer, he produced some important instrumental works, especially in chamber music and symphony.

RAFFLES, SIR THOMAS STAMFORD, Kt. (1781-1826), Brit. colonial gov.; gov.-gen. of Java, 1811-16, and showed initiative and wisdom; pub. *History of Java*, 1817; lieut.-gov. of Sumatra, 1818-23; defeated Dutch ambitions in Archipelago by founding Singapore 1819; founded Zoological Soc., London.

RAFFLESIA, a genus of parasitic stemless plants, producing enormous flowers more than a yard across. *R. arnoldi*, the finest species, is parasitic on the roots and trunk of species of Cissus.

RAFINESQUE, CONSTANTINE SAMUEL (1784-1842), an American botanist, *b.* in Turkey. He was professor of botany in Transylvania University and lectured and wrote much on botanical subjects.

RAFTS OR PONTOONS when carried as life-saving appliances by vessels would not be lowered from davits, but would be thrown overboard or merely allowed to float away when the ship sank. They are not recognized as part

of the equipment of foreign-going ships but may be placed on home-trade vessels.

RAGATZ (47° 1′ N., 9° 30′ E.), watering-place, canton St. Gall, Switzerland; mineral springs.

RAGLAN, FITZROY JAMES HENRY SOMERSET, 1ST BARON (1788-1855), Brit. general and diplomatist; distinguished in wars against Napoleon. losing arm at *Waterloo*; commander-in-chief of Crimean army, 1854, leading at *Alma, Balaclava,* and *Inkerman*; made field-marshal, 1854; *d.* before Sebastopol.

RAGNAROK (Ger. *Gotterdammerung*), the 'twilight of the gods,' end of the world, when the gods shall be killed.

RAGS are worn, torn, and shapeless remnants or shreds of textile material. All R., from whatever materials, now have some commercial value, those of wool being the most valuable, followed by linen, cotton, and silk. Until the middle of the 19th century all paper was made from R., but the introduction of wood-fibre and esparto grass as material for paper caused a decline in the amount of R. used. Superior paper, such as is required for bank-notes, etc., is still made from linen and cotton R.; since they contain no silica the method of manuf. is not so complex. Woolen R. are largely used in the manuf. of the cheapest kind of clothing, known as 'Shoddy.'

RAGUSA (42° 37′ N., 18° 7′ E.), town, Dalmatia, Jugo-Slavia; surrounded by walls and fortified; episcopal see, has cathedral, built in XVIII. cent. to replace an older foundation; several interesting old churches; Dominican and Franciscan religious houses; among most notable buildings in the Rector's Palace, a Transitional structure of XV. cent.; after being subject to Venice and Hungary in succession, R. became an independent republic in XV. cent.; captured by France, 1805; ceded to Austria, 1814; to Jugo-Slavia, 1920. Pop. 14,000.

RAGUSA (36° 56′ N., 14° 45′ E.), town, Syracuse, Sicily, on Ragusa; silks, woolens. Pop. 32,500.

RAGWORT (*Senecio*), composite plant with yellow florets; Common R. (*S. jacobaea*), is a weed.

RAHWAY, city of New Jersey, in Union co. It is on the Pennsylvania railroad, and on the Rahway river. It is an important manufacturing city and its industries include the making of printing presses, carriages, railroad signals, clothing, shoes, and it has also a large printing and bookbinding establishment. There is a public library and a high school. Pop. 1920, 11,042.

RAIBOLINI, FRANCESCO DI (*d.* 1533), an Italian painter and engraver; *b.* in Bologna. He excelled especially in madonnas.

RAICHUR (16° 12′ N., 77° 24′ E.), town, Hyderabad State, India. Pop. 22,500.

RAIGARH (21° 54′ N., 83° 25′ E.), native state, Central Provinces, India. Capital, Raigarh. Pop. *c.* 7,000. Pop. of state, *c.* 183,000.

RAIKES, ROBERT (1735-1811), the founder of Sunday schools; *b.* at Gloucester, and in 1757 succeeded his father as printer and proprietor of the *Gloucester Journal.* He continued this work till 1802. He had early been active in the agitation for prison reform, and in 1780 started a Sunday school at Gloucester. A statue of him stands on the Thames Embankment.

RAIL FAMILY, RALLIDÆ, a world-wide family of birds, including the common Land-Rail or Corncrake (*Crex pratensis*), the Moor or Water Hen (*Gallinula chloropus*), with red and yellow bill and greenish legs, and the Coot (*Fulica atra*), a common pond bird easily distinguished by the white bald patch on its forehead. The Rallidæ are unready flyers frequenting well-vegetated localities, most species, apart from the Land-Rails, preferring the neighborhood of lakes and rivers.

RAILROAD CONDUCTORS, ORDER OF. See BROTHERHOODS, RAILROAD.

RAILWAY BROTHERHOODS, organizations of the employees of American railroads, not affiliated with the American Federation of Labor. The most important of these is the Brotherhood of Locomotive Engineers, headed by Warren Stone, which was formed in 1863 and has a membership of about 75,000. The members of this body have been classed as the 'aristocrats of labor,' and are extremely conservative though together with the other brotherhoods they supported the movement for the Plum Plan for nationalizing the railroads, in 1920. The next most important organization is the International Order of Railway Conductors, established in 1868, with a membership of about 50,000; after which follow the Brotherhood of Locomotive Firemen and Enginemen, founded in 1873, with a membership of about 86,000; the Brotherhood of Railway Trainmen, established in 1863, with a membership of 126,000; and the Brotherhood of

RAILWAYS

Railroad Telegraphers, founded in 1886 and with a membership of 30,000. The first four constitute the 'Big Four' in labor organization. There are numerous other organizations among railroad employees, including those of the maintenance-of-way men, which increased tremendously during the war, and the shopmen, who were engaged in a nation-wide strike in 1922-23, but all of these lack the strength and solidarity of the above.

RAILWAYS. Railways originated in the tramways used in mining districts round Newcastle-on-Tyne, England, for conveying coal from the pits to the Tyne. The date of invention of these tramways is not certain, but they were probably in use as early as the middle of the 16th cent. The first rails were simply wooden beams, flanges being added later to prevent the wagons from leaving the rails. The wagons were drawn by horses, and one horse could draw a load of 42 cwt., as compared with 17 cwt. along the ordinary road. Up to the end of the 17th cent. little or no advance was made in construction, but *c.* 1700 the wooden beams were covered with a thin sheathing of iron in order to add to their life.

This sheathing was found to be incapable of resisting the weight of the loaded wagons, and *c.* 1740 rails consisting entirely of cast-iron were substituted. This kind of railway became fairly general in mining districts, but it attracted little attention for general traffic, and, moreover, it had to face the opposition of those interested in the promotion of canals. A further improvement was made by placing flanges on the wagon wheels instead of on the rails, and trains of small wagons linked together superseded the single large wagon. The Surry Iron Ry., sanctioned by Parliament in 1801 and opened in 1804 was first public railway built under parl. powers. It ran from Wandsworth to Merstham, and was operated in parts until 1845. Horse power only was used.

The possibilities of the railway system gradually became realized, and efforts were made to utilize steam instead of horse traction. In 1802 an engineer named Trevithick obtained a patent for a steam carriage, and in 1804 this, the first practical locomotive, was used for wagon haulage on the Merthyr Tydfil Ry. The locomotive was to a certain extent successful, but it could haul only a load of 10 tons at a rate of about 5 m. an hour. No immediate improvements upon this invention were made, largely owing to the belief that locomotives with plain wheels running on plain rails could not draw heavy loads or ascend moderate inclines, and that cogged wheels and rack rails were necessary. In 1811 it was demonstrated on the Wylam Ry. that the weight and friction of a locomotive were sufficient for the purpose, and from that time steady progress was made.

During the years 1844-6 an absolute railway mania prevailed, and reckless speculation and overcompetition resulted in the financial panic of 1847.

The example of England was quickly followed by U.S., and with characteristic enterprise the railway mileage increased between 1840 and 1880 from 2,818 to 87,801. Railways were speedily opened on the Continent, many of them being constructed by Brit. engineers, and largely on Brit. capital. France, Belgium, and Holland took the lead, Germany, Austria and Russia being somewhat behind. Great railway developments were also made in the Brit. Colonies, Canada, Australia, and India.

The ideal railway line would be quite straight and perfectly level, but this is seldom if ever practicable. Elevations and depressions have to be negotiated, and while in some cases they may be avoided by means of curves, in others the constructor has to resort to cuttings, tunnels, and bridges. Efforts are made to arrange matters so that the earth excavated in cuttings shall be sufficient for the construction of the embankments, but this is not always possible. Small streams are conveyed through embankments by culverts of brick or masonry, bridges or viaducts being used for crossing rivers, roads, or deep narrow valleys. Bridges are also used to carry public roads over the line, or to carry one line over another. Level-crossings are now as far as possible avoided in thickly populated districts where the traffic is heavy, on account of their danger and general inconvenience for cross traffic.

When the levels are determined and the embankments and cuttings are complete, a special track is laid down to carry the line. This is formed of a layer of small stone, gravel, slag, and other material, called ballast. On this are laid the sleepers, to support the rails. Sleepers are usually made of wood, but steel is also employed, especially where wood is scarce or liable to be attacked by white ants. Before being laid down wooden sleepers are usually treated with creosote. The rails are of two chief types, the bull-headed rail and the flat-footed or Vignoles rail. Bull-headed rails are wedged in cast-iron chairs bolted to the sleepers, and flanged rails, which have a flat base, are attached to the sleepers by hook-headed spikes, the heads of which project over the flanges.

Rails formerly were made of iron, but steel of special toughness and hardness is now used. The distance between the two rails forming the line is called the *gauge*. The standard gauge is 56½ inches wide. It is fairly general on the continent of Europe, but the normal gauge in Russia is 5 ft., and in Spain and Portugal 5 ft. 5¾ in. In India and S. America 5 ft. 6 in. is very general, together with the metre gauge; Australia has 3 ft. 6 in., 4 ft. 8½ in., and 5 ft. 3 in., and in many Brit. colonies the gauge is 3 ft. 6 in. In Ireland it is 5 ft. 3 in.

The rate at which a line rises or falls from the horizontal is called the *gradient*, and is usually expressed by stating the amount of rise or fall occurring in a certain distance, such as 100 ft., or by the horizontal distance in which the difference in level amounts to 1 ft. Gradients may also be expressed in percentages. The load which an engine can haul over any stretch of line is determined by the steepest gradient, and this is therefore known as the ruling gradient. The adhesion between the wheels and the rails is lessened in damp weather, and the maximum gradient must be such as can be negotiated with a full load under all weather conditions. In theory gradients of 1 in 16 are possible, but practically 1 in 22½ is about the limit, and this is too great for general use. For the steep slopes of mountains rack railways are necessary. In these the engine is fitted with a cogged wheel engaging in a toothed rack along the line, and gradients of 1 in 2 are possible. For excessively steep inclines cable railways are employed.

Trains are transferred from one set of rails to another, as for instance from a main line to a siding, by *points* or *switches*. At the junction of the four rails the inner two are tapered to a point, and fixed so far apart that if one point is pushed against the outer rail of the main line or of the siding, there is room left between the other point and the remaining outer rail to allow the passage of a train. The opposite wheel flanges travel along the other tapering rail, and thus take the required direction. Where a branch line leaves the main line, or where one set of rails crosses another set, check rails are placed to guide the wheel flanges. Lengths of check rail are usually laid inside the running rails on curves to safeguard any tendency to derailment. Switches are usually connected with the signal cabins by means of iron rods passing over grooved wheels fixed on supports close to the ground, and are worked in conjunction with the signaling. Points may also be set by small hand levers, as in shunting yards.

Signaling is done mainly by disks and *semaphores*, with lamps. The common semaphore signal is a movable arm working on a spindle, and fixed to an upright post so that it is horizontal and at right angles to the line. The normal or horizontal position indicates that the train must stop, and the arm is pulled down or raised at an angle when the train may proceed. At night the movements of the arm are indicated by the colors shown by a lamp, usually red for stop and green for go ahead. In addition to the main or home signals there are also distant or cautionary signals, usually placed from 600 to 1,000 yds. before the home signals, the distance varying with the gradient.

At the close of 1923 the total railway mileage of the world was estimated at 750,000, the approximate figures being: Europe, 223,000; N. America, 323,000; S. America, 52,000; Asia, 69,000; Africa, 29,000; Australasia, 24,000.

RAILWAYS, AMERICAN. A short quarry line built at Quincy, Mass., in 1826, followed by the building of the first track of the Baltimore and Ohio railroad in 1828, began the railway system of the United States, which was to develop to a mileage of 252,000 in 1920. This is more than one-third of the world's aggregate mileage, reported in 1919 at 730,988. The country whose railway mileage came nearest to that of the United States, though a long way behind, was Germany, which had 39,600 miles of track. Canada followed with 39,058, and British Indian with 36,616 miles. In 1918 American railroads carried 1,084,997,896 passengers and 2,305,824,940 tons of freight. These figures compare with the traffic on British railways in the same year. Though the latter's mileage is only 23,709, they carried more passengers namely, 1,591,146,000, but only 416,672,532 tons of freight. The states having most railroad trackage are Texas, Pennsylvania, Illinois, Iowa, Kansas, Ohio, Michigan, Minnesota, New York and California.

The capitalization of the railroads in 1920 was $21,891,450,785. Their post-war financial condition may be conveyed by an analysis of the average dollar received by the railroads as income in 1921. Labor tools, 46.9 cents of each dollar; materials, supplies and miscellaneous, 20.6 cents; fuel, 9.5 cents; taxes, 5 cents; loss and damage, injuries to persons and insurance, 2.9 cents; depreciation and retirements, 2.8 cents; and hire of equipment and joint facility rents, 1.4. Expenses therefore took 89.1 cents of each dollar, leaving 10.9 cents net operating income available for

interest on bonds or notes and stock dividends. But this is not the whole story.

The World War of 1914-18 retarded new construction, though for a long period previously the mileage added each year was more directed to laying down extra tracks to actual extensions of existing lines. In 1913, 3,071 miles of line were laid down; the next year new trackage represented only 1,532 miles and in 1915, 933 miles, while in 1920 and 1921 new lines had declined to 314 and 475 miles respectively. With 1922 came a revival in railroad construction.

American participation in the World War brought the roads under government control in 1917 for the duration of hostilities and for such time thereafter to be determined by the President, the government guaranteeing a return equivalent to the average earnings made by the roads in the three previous years. Government operation lasted for twenty-six months, or to the close of February, 1920, and resulted in a deficit of more than $650,000,000. For the next six months nearly all the roads were operated by their owners with an income guaranteed by the government, and with September 1, 1920, the roads were again privately operated with public regulation but without any guarantee. The Transportation (or Esch-Cummins) Act of that year provided that a railroad thereafter earning a net income in excess of 6 per cent. of the value of its property halve the excess with the government, the sum received by the latter to form a contingent fund for loans to the roads. The same measure also established a loan or revolving fund for assisting the carriers to rehabilitate their properties after their spell of government control, and for this fund Congress then appropriated $300,000,000. From November, 1921, to November, 1922, the government paid the railroads $450,090,804 for the guarantee provided for in the Transportation Act. The payments represented reimbursements of deficits on account of federal control during the war period. The government also loaned the railroads $317,886,667, of which $98,684,545 had been paid back towards the close of 1922. The federal Budget of that year earmarked $234,960,000 for the railroads for 1923, and $40,183,847 for 1924.

During the Harding administration the railroads greatly occupied the attention of Congress and the country. In the Congress that expired in March, 1923, no less than 134 measures for railroad regulation were proposed. The Transportation Act added appreciably to the regulatory powers of the Interstate Commerce Commission. It created the Railroad Labor Board to determine rates of wages and salaries, established a system of rate-making to enable the roads to earn an average net return of 6 per cent on a valuation tentatively determined at $18,200,000,000, and also provided for consolidation of the railways into a limited number of systems.

The condition of the railroads four years after the World War's close showed rolling stock, trackage and many terminals unequal to traffic needs and also a car shortage. Shippers sought lower rates and better facilities, labor demanded higher wages and a larger part in the operation and government of the lines, and the railway executives complained of excessive regulation and that they were required to operate under impossible conditions. The chief need was new capital. It was estimated that extensions and betterments aggregating $1,000,000,000 a year were needed all over the country. The railroads' endeavors at betterments in 1920 may be thus visualized: On 252,215 miles of railroads an average of a little over $2,158 per mile was spent to improve tracks and equipment, and of this amount the stockholders provided $2 per mile, but for the remaining $2,156 per mile the railroads had to run into debt. Trade recovery in 1922 and 1923 improved greatly the transportation outlook, with its promise of Congressional authority for a number of harmonized consolidations in the interest of economy and better service. See INTERSTATE COMMERCE.

RAIN, condensed vapor of atmosphere. See ATMOSPHERE.

RAINBOW, caused by the sun shining on very small drops of water, the sun's rays being bent and split up into their primary colors on passing through such a drop. Sometimes several bows are seen, the brightest, called the Primary Bow, being red on its outer and violet on its inner edge. A larger and fainter bow (Secondary Bow), often seen outside the primary, is colored red on its inner and violet on its outer edge. The primary bow subtends an angle of 41° at the observer's eye, and the secondary an angle of 52°. The phenomenon is best seen with a good sun behind the observer and large drops of rain in the opposite direction.

RAIN GAUGE, an instrument used to measure the quantity of rain which falls at a given time.

RAIN-MAKING. Attempts to bring about artificial precipitation of rain have been frequent. Many of these have been obviously fraudulent in character,

devised merely to extort money from credulous farmers. Some, however, have been genuine efforts to apply scientific principles to the problem of controlling rainfall, and have consisted of various electrical devices, the bombardment of clouds with dust and other ingenious processes. Little, if any, success has been obtained. Recently, the use of electrically charged sand, as suggested by Professor Wilder D. Bancroft and Dr. L. Francis Warren, has aroused much interest. The sand is sprayed from airplanes above the clouds. The theory of the process is that when a negatively charged grain of sand covered with water vapor comes in contact with a positively charged drop of water, the two unite and their combined mass gives them sufficient weight to fall by gravity. The airplane is equipped with an electric generator, and the sand is forced through a nozzle, the grains acquiring their charge just as they emerge. They are scattered by the propeller of the plane, and the charge imparted to them can be made either positive or negative at will, by the pull of a switch. The U. S. Department of Agriculture has issued a statement to the effect that no rain-making process is likely to be of any practical value, and points out that the chief cause of drought is not lack of precipitation but lack of cloud.

RAINE, WILLIAM MACLEOD (1871), author; *b.* in London, England. In 1881 came to the United States and in 1894 graduated from Oberlin College. Principal of a school from 1897-1898, and reporter on different Seattle and Denver papers until 1905. Until 1913 editorial writer. Author of *A Daughter of Raasay*, 1902; *Wyoming*, 1908; *Ridgway of Montana*, 1909; *Bucky O'Connor*, 1910; *A Texas Ranger*, 1911; *Mavericks*, 1911; *Brand Blotters*, 1912; *Crooked Trails and Straight*, 1913; *The Splendid Vision*, 1913; *The Pirate of Panama*, 1914; *A Daughter of the Dons*, 1914; *The Highgrader*, 1915; *Steve Yeager*, 1915; *The Yukon Trail*, 1917; *The Sheriff's Son*, 1918; *A Man Four Square*, 1919; *Oh You Tex*, 1920; *The Big Town Round Up*, 1920; *Gunsight Pass*, 1921; *Tangled Trails*, 1921; *Man Size*, 1922.

RAINIER, MOUNT, one of the highest peaks in the United States, rising about 14,400 feet in Pierce co., Washington, 41 miles to the southeast of Tacoma. It is part of the Cascade range and an old volcano whose last eruption was in 1870. Vancouver, the navigator, who discovered it in 1793, named the mountain after Admiral Rainier of the British Navy. It is sometimes known as Tacoma. Snow and ice cover its crest and it has a number of glaciers that radiate from it for miles. The lower parts are thickly forested. Frequent ascents are made to the summit, though the journey is difficult. The mountain is situated within the Rainier National Forest, and its immediate region, almost a square of 18 miles in length and depth, became perpetuated as the Mount Rainier National Park by an act of Congress passed in 1899.

RAINSFORD, WILLIAM STEPHEN (1850), a clergyman, *b.* at Dublin, Ireland; *s.* of Marcus and Louisa Dickson Rainsford. He was educated at St. John's College, Cambridge, Eng. He was curate of St. Giles' Church, Norwich, Eng., 1872-76, assistant rector of St. James' Cathedral, Toronto, Can., 1878-82, and rector of St. George's Church, New York City, 1882-1906. Author *Seven Last Words on Cross*, 1894; *Preacher's Story of His Work*, 1901, and others.

RAINY LAKE, N. America, 120 m. from Lake Superior, and part of the boundary between Canada and the United States. Length, 40 m., breadth, 3 to 8 m.

RAINY RIVER, a tn. of Ontario, Can., 145 m. S. E. of Winnipeg; trades in lumber. Pop. 2,500.

RAIPUR (21° 11′ N., 81° 32′ E.), town, Nagpur, Central Provinces, India, grain, cotton. Pop. *c.* 33,000.

RAISA, ROSA (1893), prima donna soprano; *b.* at Bailystock, Poland. Educated in music at conservatories in Naples, Italy. Sang for several seasons at various places, including Italy and America. Since 1913 with Chicago Opera Company. Had leading roles in *Jewels of the Madonna*, *Francesco de Rimini* and *Phaedra*.

RAISINS, the name given to the grape when dried. Quantities of R. are exported from the Mediterranean shores, while others come from France, Smyrna, and California. The variety known as muscatels are dried while partly attached to the vine. The process of drying takes place in the sun or in specially heated houses. The cultivation of raisins has become a great industry in California in recent years.

RAISULI, MULAI BEN MOHAMMED (*c.* 1867), Moroccan bandit; kidnapped, 1903, W. B. Harris, Times correspondent, and others, and to obtain their release Sultan was forced to make him governor of Tangier district, 1904; lawlessness caused his removal, 1906. Was largely responsible for uprising of

tribesmen which forced Fr. interference in Morocco, 1907. With Ger. aid again raised revolt, 1918. Surrendered to French, 1923.

RAJAH, OR (better) **RAJA** (from sanskrit *rajan*, king; *cf.* Lat. *rex*), the title borne by a Hindu prince. Other forms of R. are *rao*, *rana*, and *raval*. The title of the Hindu emperor of Vijanyanaga in S. India was *raya*. R's have been in existence in India from very early times; the title was hereditary as a rule, while men of conspicuous valor and wisdom were also elected R's.

RAJAHMUNDRY, RAJAMAHENDRI (17° N., 81° 48′ E.), town, on Godavari, Godavari district, Madras, India.

RAJGARH (24° N., 76° 47′ E.), native state, Bhopal, Central India. Pop. 90,000. Chief town, Rajgarh. Pop. 5,600.

RAJKOT (22° 18′ N., 70° 56′ E.), native state, Kathiawar, Bombay, India. Pop. 55,000. Capital, Rajkot. Pop. 37,000.

RAJMAHAL (25° 3′ N., 87° 53′ E.), village, Sonthal Pargauas district, Bhagalpur division, Bihar and Orissa, India, on Ganges; ancient capital of Bengal.

RAJPIPLA (21° 40′ N., 73° 30′ E.), native state, Rewa Kantha, Bombay, India. Pop. 120,000. Capital, Nandod.

RAJPUT, race of N. India, mostly of Hindu persuasion, but including a considerable number of Mohammedans. The Rajputs are a fine race and preeminently fighters.

RAJPUTANA (26° 50′ N., 74° E.), region, India, including Brit. district of Ajmere Merwara and a number of native states of which the largest are Jodhpur, Bikanir, Jaisalmer, Jaipur, and Udaipur; total area, *c.* 127,535 sq. miles; surface crossed by Aravalli Hills; in N. are plains and desert lands, but the S. is fertile; drained by Banas, Chambal, and other streams; livestock raised. R. was included in dominions of Moguls in the XVII. and early XVIII. cent's; it then came under control of the Mahrattas, after whose defeat by the British the different states became allies of Great Britain. Pop. 1921, 9,857,000.

RAJSHAHI (24° 30′ N., 89° E.), division and district, Bengal, India. Pop. (div.) 9,140,000; (dist.) 1,470,000.

RAKE. See IMPLEMENTS, AGRICULTURAL.

RÁKÓCZY, FRANCIS I. (1645-76), Hungarian patriot; *s.* of George II R. (see below); elected prince, 1652, but never secured throne.

RÁKÓCZY, FRANCIS II. (1676-1735), Hungarian patriot; *s.* of above; was brought up in Austria; imprisoned for plotting with France a Hungarian rising; escaped to Hungary, 1703, and led country against Austria; fled after eight years' fighting, 1711.

RÁKÓCZY, GEORGE I. (1597-1648), *s.* of Sigismund R. (see below); after death of Bethlen, 1629, and abdication of his *s.* Stephen, became Prince of Transylvania, 1630; went to war with Austria and won religious liberty for Hungary.

RÁKÓCZY, GEORGE II. (1621-60), Prince of Transylvania; *s.* of above; met with disaster in Thirty Years War; deposed by Turkey.

RÁKÓCZY, SIGISMUND (1544-1608), Hungarian patriot; supported insurrection of Bocskay, on whose death he was elected Prince of Transylvania, 1607.

RALEIGH, a city of North Carolina, the capital of the state and the capital of Wake co. It is on the Southern, the Seaboard Air Line, and the Norfolk, Southern railroads. The city has a large trade in cotton and tobacco. Its industries include flour mills, phosphate works, foundries, machine shops, brick making plants, car shops and an ice factory. It has many important public buildings, including the State Capitol, the U. S. Government Building, State Penitentiary, State Institution for Deaf and Dumb and the Blind, and the State Asylum for the Insane. It is the seat also of the State Agricultural and Mechanical College, the Baptist Female College, Shaw University, Peace Institute and several private schools. Near the city is the University of North Carolina and Wake Forest College. Pop. 1920, 24,418.

RALEIGH, SIR WALTER (1552-1618), Eng. courtier, soldier, traveler, and author; *b.* Hayes, Devonshire; brought up in anti-Catholic, anti-Span. traditions; left Oxford to aid Huguenots 1569; took part in rising of Netherlands against Spain; sailed in unfortunate voyage of half-brother, Sir Humphrey Gilbert, 1579; served in Ireland, 1580; became personal favorite of Elizabeth. R. planted Eng. flag in 'Virginia,' but failed in several attempts at colonization; brought home hitherto unknown potato and tobacco plants; fought against Armada, 1588; fell from favor by marriage, 1593, but ultimately restored; expedition to Guiana, 1595;

commanded in 'Essex' Cadiz expedition, 1596, and attack on Azores, 1597. Imprisoned on charge of treason, R. wrote in captivity part of projected *History of the World*; persuaded James I. to allow him to lead expedition to gold mine on Orinoco; failed to find mine, burned Span. town against king's orders and returned; executed.

RALEIGH, SIR WALTER (1861), Eng. man of letters; prof. of English since 1914 at Oxford; works include *The Eng. Novel*, 1894; *Style*, 1897; *Shakespeare*, 1907; *Six Essays on Johnson*, 1920; *Romance*, 1917, etc.

RALL, EDWARD EVERETT (1876), college president; *b.* at Van Horn, Iowa. In 1900 graduated from State University of Iowa. In 1895-1898 associate principal of public schools at Hawarden, Iowa, and principal of a high school at Red Oak, Iowa. At University of Texas, instructor in education from 1905-1911. Professor of education from 1911-16 at University of Tennessee. Since 1916, at North-Western College, Illinois, as president and professor of education.

RALPH, JULIAN (1853-1903), author and journalist; *b.* and *d.* New York City. He started his career as a compositor and reporter on small papers in New Jersey and Massachusetts. As a New York news writer he acquired some note for his accounts of the Beecher trial of 1875 and thereafter became connected with the New York Sun for twenty years. He traveled widely as a foreign correspondent, reporting the Chinese-Japanese, Turco-Greek, and Boer wars, the diamond jubilee of Queen Victoria and the coronation of the Russian Czar. Much of his journalistic writings reappeared in book form.

RALSTON, SAMUEL MOFFETT (1857), governor; *b.* in Tuscarawas, Ohio. Educated in different schools of Indiana. In 1886 admitted to the bar and practiced at Lebanon, Ind. In 1913-17, governor of Indiana. He was elected to the United States Senate in 1922.

RAM, a steam, iron-clad ship of war, with a heavy prow for ramming. It is an important element in coast defense.

RAMANÁD, the ninth month of the Mohammedan year. It was in this month that Mohammed received the revelation of the Koran, and hence it is of peculiar sanctity.

RÁMÁYANA, one of the two great Sanskrit epics of ancient India, the other being the Mahàbhárata. The R. is believed to be the older of the two, and is the shorter; it differs from the Mahàbhárata in that it is apparently the work of a single mind, and not a compilation. It is attributed to Válmíki who seems, at any rate, to have been a real personage.

RAMBAUD, ALFRED NICOLAS (1842-1905), Fr. historian; associated with Lavisse in compilation of *Historie generale*, both being Fr. pioneers of new Ger. hist. school; important books on Byzantine subjects, Germany, Russia, and Fr. history.

RAMBOUILLET (48° 40′ N., 1° 48′ E.), town, Seine-et-Oise, France; celebrated ancient chateau. Pop. 6,200.

RAMBOUILLET, CATHERINE DE VIVONNE, MARQUISE DE (1588-1665), *dau.* of Ital. Marquis de Tisani. With her *dau.*, Julie d'Angennes, in their Paris salon, L' *Hotel de Rambouillet*, she received select society of courtiers and literary men and women, and started *salon* movement of XVII. and XVIII. cent's; laid down canons of lit. and taste; poems by famous men offered to the *dau.*, 1641, as *Guirlande de Julie*.

RAMEAU, JEAN PHILIPPE (1683-1764), Fr. composer and theorist; conductor of Opéra Comique and court composer, 1745; wrote *Treatise on Harmony*, *Nouveau systeme*, etc.; operas, *Hippolyte et Aricie*, *Castor et Pollux*, etc.

RAMÉE DE LA, LOUISE. See OUIDA.

RAMESES, the name of several kings of ancient Egypt. *Rameses* I., the founder of the 19th dynasty; he lived about 1370 B. C.; he reigned only two years, and those were spent in severe fighting. *Rameses* II., the Sesostris of the Greeks, frequently called the Great, the grandson of Rameses I. He was a man of extraordinary vigor and pride, a great builder, and a mighty warrior. An epic poem by Pentaur describes how his personal courage saved him against great odds during his campaign against the Hittites. He was supposed to be the father of nearly one hundred sons and fifty-nine daughters. His rule was oppressive, and his extravagance greatly impoverished the country. *Rameses* III., 1225 B. C., founder of the 20th dynasty, famous for his great victory over the confederation of people from Crete, Cyprus, Philistia, and the northern Mediterranean, who combined with the Libyans and attacked Egypt by land and sea. R. won the great naval battle near Pelusium, and also defeated the land force. His trading fleets were extremely successful, and considerably increased the commerce of Egypt. Nine other kings of the name of R. followed Rameses III.; they were not great men as far as

we know, the last of the name, Rameses XII., was entirely under the control of the priests. His son, Prince R., was murdered, and the high priest, Her-Hor, seized the throne. See EGYPT—*History*.

RAMESES, RAAMSES, RAMESSES, town, Goshen, Lower Egypt; built by Israelites; received name from Egyptian king, Rameses II.; site disputed.

RAMESWARAM (9° 17′ N., 79° 21′ E.), town, Madura district, Madras, India, on island of Rameswaram; place of pilgrimage. Pop. 7,200.

RAMIE, also called Rhea, and China Grass; a valuable fibre derived from the inner bark of *Baehmeria niveae*, a member of the Urticaceae largely cultivated in China. The fibre is exceptionally long and tough, but the gum with which it is impregnated renders it unsuitable for certain types of work.

RAMILLIES (50° 40′ N., 4° 55′ E.), village, Brabant, Belgium; scene of Marlborough's victory over French, 1706.

RAMNAD (9° 22′ N., 78° 52′ E.), town, Madura district, Madras, India. Pop. 15,500.

RÂMNICU, SARAT, RIMNICU (45° 28′ N., 27° 5′ E.), town (and department), Rumania, on Râmnicu; scene of defeat of Austro-Russian army by Turks in 1789. Pop., department, 137,000; town, 14,000.

RAMNICU VALCEA, RIMNICU (45° 14′ N., 24° 20′ E.), town, Valcea department, Rumania, on Aluta; trade in wine and salt. Pop. 7,500.

RAMPART. See FORTIFICATION.

RAMPOLLA, MARIANO, COUNT DEL TINDARO (1843-1913), Ital. ecclesiastic; entered the papal service, 1869; served as counsellor of the papal embassy and papal nuncio at Madrid between 1875 and 1887; in the latter year was made cardinal and appointed papal secretary of state, a position which he resigned on the death of Pope Leo XIII., 1903.

RAMPUR (28° 48′ N., 79° 5′ E.), native state, United Provinces, India. Pop. 1921, 453,600. Capital, Rampur, on Kosila. Pop. 1921, 73,200.

RAMPUR BEAULEAH (24° 22′ N., 88° 39′ E.), town, on Ganges, capital of Rajshahi district, Bengal, India. Pop. 22,500.

RAMSAY, ALLAN (1686-1758), Scot. poet; *b.* at Leadhills, Lanarkshire; established as wig-maker in Edinburgh. He published *The Tea Table Miscellany* and *The Ever Green* collections of poems, but it is as the author of *The Gentle Shepherd* that he is chiefly remembered.

RAMSAY, ALLAN (1713-84), Scot. portrait-painter; *s.* of author of *The Gentle Shepherd*. From 1767 he was principal portrait-painter to the King.

RAMSAY, SIR ANDREW CROMBIE (1814-91), Brit. geologist; *b.* Glasgow; began life as a chemist, taking up geol. as a hobby; served in Geological Survey, 1841-81.

RAMSAY, SIR WILLIAM (1852-1916), Scot. chemist; *b.* Glasgow; appointed prof. of chem., Univ. College, Bristol, 1880; prof. of chem., Univ. College, London, 1887-1912; made investigations on 'evaporation and dissociation,' which led later to researches on 'molecular surface energy of liquids;' discovered, jointly with Lord Rayleigh, the element Argon; in the investigation of possible sources of this substance, he also discovered Helium; subsequently isolated three other gaseous elements, xenon, krypton, and neon; discovered that radium in its apparent disintegration gives off helium; was awarded the Nobel prize in chem., 1904. He pub. text-books of marked originality on chem., a treatise on the *Gases of the Atmosphere*, 1902, and *Essays, Biographical and Chemical*, 1908.

RAMSBOTTOM (53° 39′ N., 2° 19′ W.), town, on Irwell, Lancashire, England; iron foundries; cotton mills. Pop. 15,000.

RAMSGATE (51° 20′ N., 1° 25′ E.), seaport, watering-place, Isle of Thanet, Kent, on North Sea. Pop. 1921, 30,000.

RAMUS, PETRUS (1515-72), Fr. humanist; *b.* Picardy, *s.* of charcoal burner; ed. Navarre; wrote treatise on logic; inclines towards rhetoric; denies fourth figure of syllogism; deduces figure from position of middle term.

RAMUSIO, GIROLAMO (1450-86), *bro.* of above; translated Avicenna's works from Arabic into Italian, and wrote various treatises and verses.

RAMUSIO, GIAN BATTISTA (1485-1557), *s.* of Paolo; secretary of Venetian Council of Ten, 1533, and held various other offices in republic. Famous as editor of *Navigationi e Viaggi*, the Italian Hakluyt, pub. 1550-59.

RAMUSIO, PAOLO GIROLAMO GASPARE (1532-1600), *s.* of above; translated with amplifications part of chronicle of crusader Villehardouin into Italian.

RAMUSIO, PAOLO, RHAMNUSIO, RANNUSIO (*c.* 1443-1506), Venetian

magistrate and jurist; pub. *De re militari* of Valturius, which he translated into Italian.

RANCE, DOMENIQUE ARMAND JEAN LE BOUTHILLIER DE (1626-1700), the founder of the reformed order of La Trappe (see TRAPPISTS), was *b.* of noble parents in Paris. He was a favorite of Cardinal Mazarin, and lived a gay life at court, but in 1662 suddenly resigned all his preferments and retired to the Abbey of La Trappe in Normandy, where he instituted the rigid discipline which distinguishes the order. He published an edition of *Anacreon* with notes, 1639; *Conduite Chretienne*, 1697, and many other religious treatises.

RANCH, or **RANGE**, the name given to the vast areas over which sheep and cattle are grazed in the United States and elsewhere. It is only in the west that ranching is carried on.

RANCHI (23° 22′ N., 85° 22′ E.), chief town of Chota Nagpur division, Bihar and Orissa, India. Pop. 25,970. Ranchi district has area of 7,128 sq. miles. Pop. 1,187,925.

RANCK, SAMUEL HAVERSTICK (1866), *b.* at Lancaster, Pa. In 1892, graduated from Franklin and Marshall College. Was librarian of Goethean Society Library for two years and re-catalogued it. In 1892 at Enoch Pratt Free Library and from 1898-1904, assistant librarian. Since 1904 librarian at the Public Library, Grand Rapids Mich. Editor, Franklin and Marshall College Catalogue of Officers and Students, 1787-1903, with the addresses of those living, etc., 1903. Was editor-in-chief of Franklin and Marshall College Alumni Association of publications. In 1921-1922 vice president of the American Library Association

RAND (*i.e.*, low range of hills), popular and abbreviated name for *Witwatersrand*, rich gold mines W. of Johannesburg, S. Africa.

RANDALL, JAMES RYDER (1839-1908), Civil War poet and journalist; *b.* Baltimore, Md.; *d.* Augusta, Ga. He was originally a teacher of English literature in a Louisiana college. In 1861 he wrote his famous Confederate poem, *Maryland, My Maryland*, inspired by an attack of Union troops in Baltimore at the beginning of the Civil War. This rousing song, which was set to music and became known as the Marseillaise of the South, was followed by other Confederate war verse. After the war he became editor of the Augusta Constitutionalist, and, towards the close of his life, of the New Orleans Morning Star.

RANDALL, SAMUEL JACKSON (1828-1890), former Speaker of U. S. House of Representatives; *b.* Philadelphia; *d.* Washington, D. C. After engaging in mercantile pursuits in his native town, he entered the city council and later the Pennsylvania Senate. He saw service in the early stages of the Civil War as a cavalryman, rising from the ranks to captain. Elected to Congress in 1862 as a Democrat, he remained a member of the House of Representatives for 28 years and became of national note. By a filibuster lasting 72 hours he prevented the passage of the Force Bill in the 43rd Congress, and in the next three Congresses served as Speaker. He presided over the House proceedings relating to the Hayes-Tilden presidential dispute of 1876, and, though not favoring the Electoral Commission, he fought against a movement within his own party to break up the recount of the electoral votes, when it was known that the Commission would decide in favor of Hayes. In 1880 he received considerable support as Democratic candidate for President but did not obtain the nomination.

RANDAZZO, ancient Tissa (37° 50′ N., 14° 57′ E.), town, Sicily, at foot of Mount Etna. Pop. (commune) 12,500.

RANDERS (56° 27′ N., 10° E.), town, Jutland, Denmark, on Gouden-Aa; manufactures gloves. Pop. 1921, 26,495.

RANDOLPH, ALFRED MAGILL (1836-1918), an American bishop, *b.* in Winchester, Va. In 1855 he graduated from the College of William and Mary and the Theological Seminary of Virginia. Ordained in 1860 a priest of the Protestant Episcopal Church and was rector of St. George's Church, Fredericksburg, Va., from 1860-62. A chaplain in the Confederate Army, 1862-65. Rector, 1865-67, at Christ Church, Alexandria, and Emmanuel Church, Baltimore, 1867-83. He became Coadjutor Bishop of Virginia in 1883 and elected Bishop of Southern Virginia in 1892.

RANDOLPH, EDMUND JENNINGS (1753-1813), first U. S. Attorney-General; *b.* Williamsburg, Va. He was educated at William and Mary College. His *f.*, John Randolph, a loyalist, with whom he studied law, disinherited him because of his early activities against British policy in governing the colonies. When the Revolution came he was one of Washington's aides and served as the first Attorney-General under the new State Constitution of 1776. He was a member of the Continental Congress, Governor of Virginia, and upon the ratification of the federal constitution

in 1789 became Attorney-General under Washington. From 1794 to 1795 he was Secretary of State. He returned to the practice of his profession in Virginia where he became leader of the bar, and defended Aaron Burr against charges of treason.

RANDOLPH, JOHN, of Roanoke (1773-1833), Virginian patrician and statesman; *b.* Carsons, Va.; *d.* Philadelphia. He was one of the stormy petrels of American politics in the early days of the republic and acquired a wide repute for an undisciplined eloquence and erratic temper blent with a great intellect. He studied at Princeton and Columbia and read law with his kinsman, Edmund Jennings Randolph, but his education and legal training were alike desultory. He managed to enter Congress in 1799 as a Democratic-Republican, despite bitter opposition from Patrick Henry, and dominated the House as chairman of the Committee of Ways and Means, resorting to an effective style of oratory marked by an unruly vehemence and coarse invective to hold his sway. He lost his leadership, became a political free lance, forcefully independent, and his always ready inventive made him feared. He sought and failed to have Justice Samuel Chase impeached, quarreled with Jefferson, opposed the War of 1812 and the Missouri Compromise, headed the jury that impeached Aaron Burr, and fought a duel with Henry Clay. Losing his seat in the House in 1813 owing to his attitude to the War of 1812, he returned there two years after, recovered his ascendancy for a time, spent two years in the Senate, and reappeared as a member of the lower house. In 1829 he was appointed special envoy to Russia, but only held the post ten days. By his will he released his 318 slaves and provided for their support in a free state. His personality remains an abiding interest in American history.

RANDOLPH, THOMAS (1523-90), Eng. ambassador; his dispatches from Scotland constitute an important hist. source for Elizabeth's reign; envoy to Russia, 1568; France, 1573, 1576.

RANDOLPH, THOMAS, 1ST EARL OF MORAY (*d.* 1332), Scot. patriot; nephew and follower of Robert Bruce; scaled and captured Edinburgh Castle from English, 1314; second in command at *Bannockburn,* 1314; defeated English at *Milton,* 1319; Regent of Scotland, 1329-32.

RANDOLPH-MACON COLLEGES AND ACADEMIES, a group of Virginia educational institutions under Methodist control, comprising the Randolph-Macon College for men, the parent establishment, formed in 1830, and since 1868 situated at Ashland, Va., and the Randolph-Macon Women's College, founded at Lynchburg, Va., in 1893. The men's college has two academies for preparatory courses, one at Bedford City, Va., the other at Front Royal, Va., and the women's college has an institute at Danville, Va. The Ashland institution had 206 male students and 23 teachers in 1922 under the presidency of R. E. Blackwell, and at the Lynchburg College there were 632 female students and 50 teachers under D. R. Anderson in the same year.

RANELAGH, London pleasure-gardens with concert-hall, etc., fashionable in XVIII. cent.; near Thames, Chelsea.

RANGE-FINDER, a modern term used both for (1) instruments for finding the distance, or 'range' of objects to be fired at; and (2) the observer trained in their use and detailed for this duty. 'Range-finders' (formerly known as 'telemeters') are optical instruments depending on the principle that given the base and two angles of a triangle all its other elements can be determined by a simple trigonometrical formula. In the earlier systems of range-finding two observers were necessary. The base was measured by their keeping taut between them a line of 50 or 60 yards of cord. The instruments were an adaptation of the box sextant. One of them kept the target in view on a bearing at right angles to the base cord, while the other sighted it through his range-finder, and read off the result from a scale marked, not with the angle of observation, but with the distance corresponding to this angle. It was not easy to get the two observers to work accurately together, and the results were only approximately reliable. Efforts were made by many inventors to produce an efficient single instrument range-finder. This was especially important for infantry work, for it was an easier matter to carry out range-finding observations from a comparatively long base with artillery. The first single instrument range-finders were, however, devised for artillery in coast defenses and in naval work. In these cases the problem was simplified by placing the observing station on a mast or on high ground. Range-finding then became the automatic solution of a right-angled triangle, of which one side was the height of the station above sea level. This height being known, it was only necessary to determine the angle

of observation of the enemy ship, and this could be measured and the range indicated on a scale attached to a sextant telescope mounted in the vertical plane, and depressed until the target appeared on its cross wires. Various devices were proposed for a single instrument for the infantry. In the Fr. army for a while a field-glass was in use with a transparent scale behind the object glass, marked to show the apparent height of an average man at various distances. The difficulty of providing an angular range-finder arose from the fact that the base provided by a single instrument must be a short one, and the triangle to be solved would therefore be a very elongated one with a very small apex angle even at short ranges. A surveyor working with a theodolite would not attempt to determine accurately the distance of an object about a quarter of a mile away by taking its angular direction from the ends of a base a yard or two in length. Attempts were made to solve the problem by means of instruments with a delicate adjustment by micrometer screws, which, apart from other drawbacks, would become worn and make accurate results impossible.

During World War range-finders became most widely used service instruments in the army and navy, and efficient range-finders were devised on the same principle for submarines and for anti-aircraft gunnery. Besides their use for war, long-distance range-finders have been of great service in rapid surveys, especially in hilly and mountainous countries, and in mapping regions where an elaborate triangulation is not possible. Range-finders are also of use in coastal navigation, and for ships keeping station in fleet sailing.

RANGER, HENRY WARD (1858-1916), landscape painter; *b.* New York City. He studied his art in France, England and Holland and devoted much of his work depicting the New England woods and hillsides. Some of his best paintings are in the Metropolitan Museum of Art, Pennsylvania Academy, Corcoran and National Galleries, Washington, D. C., and the Carnegie Institute, Pittsburg.

RANGER, a city of Texas. Pop. 1920, 16,205.

RANGOON (16° 53′ N 96° 4′ E.), capital and chief port of Burma, on R. River; regularly laid out; has Anglican cathedral and other churches, and contains the sacred Shway-Dagon pagoda; has belonged to British since 1852; good harbor, exports rice, rubber, teak, cotton. Pop. 1921, 339,527.

RANGPUR, RUNGPORE (25° 45′ N., 89° 17′ E.), district, Rajshahi division, Bengal, India. Pop. 2,155,000. Capital, Rangpur, on Ghaghat. Pop. 16,300.

RANJIT, SINGH (1780-1839), Indian *Maharaja*; seized Lahore, 1799, Amritsar, 1802; by treaty, 1809, surrendered district south of Sutlej to Britain; established Sikh rule over whole Punjab.

RANK (ARMY), officially described as 'that character, or quality, bestowed on military persons which marks their status and confers eligibility to exercise command or authority in the military service, within the limits prescribed by law.' Rank indicates the particular position and duties of an officer in the service. The highest grade in the United States Army is that of General, followed by lieutenant-general, major-general, brigadier-general, colonel, lieutenant-colonel, major, captain, first lieutenant and second lieutenant, the latter being the lowest grade of commissioned officers. Before the War against Germany there had been only five 'full generals' in the U.S. Army: Washington, Grant, Sherman, Sheridan, and Pershing, and eight lieutenant-generals: Scofield, Miles, Young, Chaffee, Bates, Corbin, McArthur and Scott, the latter by brevet title only. During the war against Germany the title was again revived in favor of two officers, the Chief of Staff and the Commander of the U.S. Expeditionary Forces in France. The insignia of rank, carried on the shoulderstraps, are as follows: General, coat of arms and two silver stars; lieutenant-general, one large silver star and two small ones; major-general, two silver stars; brigadier-general, one silver star; colonel, silver spread-eagle; lieutenant-colonel, silver leaf; major, gold leaf; captain, two silver bars; and first lieutenant, one silver bar.

RANKE, LEOPOLD VON (1795-1886), Ger. historian; *b.* Wiehe, Thuringia. *Fursten und Volker von Sudeuropa im 16 und 17 Jahrhunderts*, 1827, shows modern hist. methods; produced famous *Die Romischen Papste, ihre Kirche und ihr Staat im 16 und 17 Jahrhunderts*, 1834-36, showing deep insight into ecclesiastical history, width of view, and excellent literary style; many other books, widely translated; *Franzosesche Geschichte vornehmlich im 16 und 17 Jahrhunderts*, 1852-57, and *Englische Geschichte vornehmlich im 16 und 17 Jahrhunderts*, 1859-67 (trans. 1875), never superseded; ennobled, 1866.

RANKIN, a borough in Pennsylvania, in Allegheny co. Its industries include the manufacture of steel wire, chains and bridges. Pop. 1920, 7,301.

RANKIN, JEANNETTE (1880), congresswoman; *b.* at Missoula, Mont. In 1902 graduated from University of Montana. In 1909 a social worker in Seattle and was active in suffrage work in Washington, 1910. California, 1911, and Montana from 1912-14. Was field secretary of the National American Woman Suffrage Association. Member of the 65th Congress, 1917-19, Montana at large. Was the first woman elected to Congress.

RANSDELL, JOSEPH EUGENE (1858), United States Senator; *b.* in Alexandria, La. In 1882 graduated from Union College, New York. Admitted to the bar in 1883 and practiced at Lake Providence, 1883-99. From 1884-96, district attorney of Louisiana, 8th Judicial District. Elected to the 56th Congress, 1899, to fill an unexpired term and reelected to 57th and 62nd Congresses, 1901-13, 5th Louisiana District. Elected to the Senate for term 1913-19, and reelected term 1919-25.

RANSOM. The sum of money which is paid in order to release a captive. It is seldom heard of nowadays, but within recent times we may mention the case of the capture of Kaid Maclean by the brigand Raisuli and his ultimate R. Formerly, however, it was the recognized custom for an officer or noble who was captured in war to R. himself. Among the three special aids paid in feudal times was one 'when the King is captured in war, and has to be ransomed.' The R. of Richard I. and King John of France were both so enormous that they practically reduced the inhabitants of England and France to poverty. The ransoming of officers is now abolished, and exchange has taken its place.

RANSOM, THOMAS EDWARD GREENFIELD (1834-64), an American soldier; *b.* in Norwich, Vt., and was a student at Norwich University. He entered the Federal Army at the beginning of the Civil War and was elected major of the Eleventh Illinois Volunteers. Took part in the attacks on Forts Donelson and Henry and was promoted to lieutenant-colonel. Served on the staff of General Grant, rose to the rank of brigadier-general and commanded a division in the Red River Campaign. Later he commanded the Seventeenth Corps and was promoted to major-general.

RANSOME, FREDERICK LESLIE (1868), geologist; *b.* at Greenwich, England. Graduated from the University of California in 1893. At Harvard College from 1896-7 as assistant in mineralogy and petrography and with the United States Geological Survey as assistant geologist, 1897-1900, and geologist since 1900. From 1912-16 in charge of sections of western areal geology and since 1912 of metalliferous deposits. Lectured in 1907 at the University of Chicago on ore deposits and Silliman lecturer at Yale in 1913. Author of various papers in scientific journals and monographs on the geology of western mining districts.

RANUNCULACEÆ, a natural order of herbaceous dicotyledons. The plants often possess underground parts stored with food, and many show palmatisect leaves (*Ranunculus bulbosus*), although in others (*R. hederaceus*) they are merely lobed. The flower, in the Buttercup, has five sepals and petals, and numerous spirally arranged stamens and carpels. Some forms such as Aconitum and Delphinium diverge considerably from this type, being zygomorphic, with petals represented by nectaries.

RAPALLO, seapt. and winter resort, Genoa, Italy (44° 22′ N., 9° 13′ E.), on Gulf of Genoa, 16 m. E. S. E. of Genoa; lace, olive oil. Pop. 11,000. Here was signed Treaty of Rapallo, Nov. 13, 1920, between Italy and Jugo-Slavia, which settled Adriatic question. By it boundaries between the two countries were fixed to run from Mount Pec to head of the Quarnero, following delimitations of Pact of London, 1916, with a few exceptions. Cities of Zara, Borgoerizzo, Cerno, Boccagnazzo, and part of Diclo, as well as minor islands and rocks of Istria, together with islands of Lagosta, Pelagosa, and small adjacent islands, to belong to Italy; other islands to go to Jugo-Slavia. Freedom and independence of Fiume to be recognized.

RAPE (*Brassica napus*) a member of the Cruciferæ, allied to the cabbage. Rape Oil or Colza is derived from its seeds; when refined, light yellow, nearly odorless; S. G. 915; uses—burning, lubrication, soapmaking.

RAPE, the carnal knowledge of a woman by violence and against her will. Formerly a capital offense, but now punishable as felony by penal servitude.

RAPEER, LOUIS WIN. (1879), university president; *b.* at Cincinnati, Ohio. In 1904 graduated from the University of Chicago. In Indiana and Minneapolis until 1909, a teacher and superintendent of schools, from 1909-10 at the University of Washington as professor of education. In 1910-11 at the College of the City of New York as instructor of social sciences. At the New York Training School for Teachers from 1911-14 as instructor and from 1914-17 at

Pennsylvania State College as professor of education. Founder and director of the National School for Social Research, Washington, 1919-20 and since 1920 president of Research University, Washington. Author of: *School Health Administration*, 1913; *Administration of School Medical Inspection*, 1913; *Educational Hygiene*, 1916; *Teaching Elementary School Subjects*, 1917.

RAPHAEL, SANTI, RAFFAELLO SANZIO (1483-1520), the greatest Ital. painter of the Rom. school, was born at Urbino. His father was a poet and painter of some distinction, but he died when his son was only eleven years old. The boy studied under Timoteo Viti, and from him learned gentleness and grace of touch of his early paintings (*e.g.*) *The Vision of a Knight*, in the National Gallery, and the *St. Michael* and *St. George* of the Louvre. At seventeen, R. went to study with Perugino of Perugia, then the most famous painter in Italy. R. quickly absorbed and translated the best qualities of his master's art, and in his *Crucifixion* and the *Conestabile Madonna* he exceeds the master. R.'s culminating work of this first period is the *Sposalizio*, 1504. Here are harmonized, blended, and transformed the excellences of his first master Timoteo and of Perugino.

R. then proceeded to Florence. He studied reverently and tirelessly the art of Donatello, Michelangelo, Mantegna and Signorelli, and Fra Bartolommeo; but Leonardo inspired him most. Here his own genius began to manifest itself in its full spendor and maturity. The most masterful work of his Florentine period was the *Entombment*, painted in 1507, for the chapel in the Duomo of Perugia.

R. proceeded to Rome in 1508. Pope Julius II. committed to him the decoration of the Vatican Stanze. On the right wall of the Camera della Segnatura he represented the Church triumphant. On the left were depicted the great Athenian philosophers. On the two remaining walls he represented Apollo and the Muses with the poets of Greece and Rome, seated on the slopes of Parnassus, and Justinian and Gregory XI. as lawgivers. The whole is a perfect blending of the Pagan and Christian ideals. In the next hall, Raphael painted the expulsion of Heliodorus from the Temple of Jerusalem, and the pope and the cardinals kneeling at the altar where the miracle of Bolsena is performed. His fresco, the *Deliverance of St. Peter from Prison* is in some aspects the finest of the series. Under the patronage of Julius II. Raphael also painted the *Madonna della Sedia*.

In 1515 Raphael commenced his magnificent cartoons of the *Acts of the Apostles*, as designs for the tapestries of the Sistine Chapel. His last days were devoted to the great *Transfiguration* which Cardinal Giulio dei Medici had ordered for the Cathedral of Narbonne. He painted the upper half of the picture, but as he sketched the lower half the brush dropped from his hand, and he was removed to his bed of death.

RAPHIA, a genus of tropical palms with large pinnatisect leaves and huge fruit spikes which sometimes exceed 200 lb. in weight. *R. pedunculata* (raphia or raffia palm) yields the useful tying material employed by gardeners. *R. vinifera* (the bamboo palm) yields wine. *R. taedigera* (the Japti palm of the Amazon) is a magnificent species.

RAPID CITY, a city of South Dakota. Pop. 1920, 5,777.

RAPIER, a long, narrow, pointed sword, introduced into England from Spain, adapted at first for both cutting and thrusting, the former in a less degree. Later it was a light, highly tempered blade used for dueling, about 3 ft. long. The fencing sword, used only for thrusting, and having no edge, is now sometimes called a R.

RAPP, GEORGE (1770-1847), religious leader; *b.* Württemberg, Germany. He founded the Harmonists, a sect aiming at reviving the practices of the primitive Christians, but persecution in Germany forced his emigration in 1803 to the United States, where, in Butler County, Pa., he founded a socialistic and celebate community of both sexes. The society later moved to and founded New Harmony, Ind., and nine years afterwards sold out their rights there to Robert Owen. They then reestablished their colony in Economy, Pa., with Rapp as their spiritual and temporal chief.

RAPP, JEAN, COUNT (1772-1821), a French general, *b.* at Colmar. Entered the army in 1788 and distinguished himself in Germany and Egypt.

RAPPAHANNOCK RIVER, rises in the Blue Ridge mountains, Va., and flows southeastward through that state into Chesapeake Bay. Its length is 250 miles, some 90 miles of which is navigable from the mouth. Below Fredericksburg, where there is a fall that provides considerable water power, the river becomes tidal. Its upper course has many rapids.

RARE EARTHS. A group of metallic oxides, occurring together, and found in Scandinavia and some other parts of the world. The elements which they contain resemble one another very

closely, and owing to the similarity of their properties and chemical behavior, they can be separated only with the greatest difficulty. In fact, mixtures of some of these elements were believed, for many years, to be single substances, and it is still thought by some authorities that some of the substances now classed as elements will be found, on further investigation, to consist of mixtures of two or more substances. The elements which up to the present have been identified in the rare earths are Scandium, Lanthanum, Cerium, Praseodymium, Neodymium, Samarium, Europium, Gadolinium, Terbium, Yttrium, Dysprosium, Erbium, Thulium and Neoytterbium. The first of the rare earths to be identified was yttria, discovered in 1794 by Gadolin, in the minderal gadolinite, and named three years later by Ekeberg, after Ytterby, in Sweden, where it was found. In 1843, Mosander showed that yttria contained three elements—yttrium, erbium and terbium. In 1880 erbia was shown to contain thulium, and in 1886, yet another element, dysprosium. In the same year, terbia yielded another element, gadolinium. The other elements of the group have been found from time to time by laborious analyses of the mixtures.

RARITAN, a river in New Jersey, formed by two branches which uniting, flow southeast and fall into Raritan Bay near the city of Perth Amboy. It is navigable as far as New Brunswick.

RASH, a superficial eruption of the skin, generally consisting of minute papules or pustules. It may be caused by external irritation, by the action of certain drugs, or by gastric and intestinal disturbances, or it may be symptomatic of a specific fever, as measles, scarlet fever.

RASHI (1040-1105), Under the system common among the Jews during the middle ages, by which the first letters of the several names were formed into a fresh cognomen, this was the name of the Rabbi Shelmo Izaak, one of the greatest of the rabbinical scholars, *b.* at Troyes. He was the first to compose a commentary on the Talmud and the books of the O.T.

RASIPUR, a tn. of British India, in Madras Presidency, 13 m. S. S. E. of Salem. Pop. 12,000.

RASK, RASMUS CHRISTIAN (1787-1832), Dan. philologist; *b.* near Odense; pub. admirable works on the Icelandic language, Anglo-Saxon grammar, Sanskrit, Persian, and Arabic; also an authority on Egyptian and Hebrew chronology.

RASKOLNIKI (Russ., schismatics), a general name applied to those who dissent from the Russian orthodox church. Besides the multitudinous modern sects, there is a large body of R. who finally separated from the orthodox church in the 17th century.

RASORES, an order of birds including common fowls. See GALLINACEOUS BIRDS.

RASPBERRY (*Rubus Idaeus*), member of the Rosaceæ commonly cultivated for its fruit, which is, technically, an aggregate of drupes, or stone fruits; plant propagates largely by means of suckers, which produce new 'canes' some distance from parent stem.

RASPE, RUDOLF ERICH (1737-94), Ger. author; *b.* Hanover; *d.* Ireland; wrote inimitable *Adventures of Baron Munchausen,* besides poems and translations.

RASPUTIN, GREGORY (1871-1916), dissolute, ignorant Russian 'lay' monk, who until his 'conversion' in his 34th year, was an ordinary peasant. He then visited Mt. Athos, Jerusalem, Kiev, Moscow, and Petrograd, where he became known as a 'healer.' He obtained great influence over the Czarina, and through her played an important political role, becoming one of the most active of the 'dark forces.' Lured to a supper party by Prince Yussupov Sumarokov Elsten, a nephew of the Czar by marriage, he was shot, and his body buried beneath the ice of the Neva. He was the author of *My Thoughts and Reflections,* 1915, which describes his pilgrimages.

RASTATT (48° 52′ N., 8° 12′ E.), town, on Murg, Baden, Germany; scene of two peace congresses— between Austria and France in 1714 and between France and Germany in 1797-99; hardware, beer, tobacco. Pop. 1920, 12,200.

RASTENBURG (54° 6′ N., 21° 22′ E.), town, E. Prussia, Germany; manufactures flour. Pop. 11,000.

RAT, the name for a number of rodents, chiefly larger members of the genus *Mus.* The Common Brown, Norway or Hanoverian R. (*M. decumanus*) is believed to have originated in China, but is now distributed over a very large area of the world, nearly always occurring in close association with man. Almost as widely distributed is the Black R. (*M. rattus*), which also was probably a native of Asia, having gradually spread westwards till it reached Britain, where for some centuries it was the prevailing species. See MOUSE FAMILY.

RATANY. See RHATANY.

RATCHET AND PAWL. A R. wheel has pointed and angular teeth against which the P. abuts. The latter is a lever, with a catch of the same form as the teeth of the wheel; thus motion is allowed only in one direction, and the device is used in capstans, etc., for safety.

RATE, BIRTH. See BIRTH RATE.

RATEL, OR HONEY BADGER (*Mellivora*), a genus of carnivorous animals. The body is powerfully built, the legs are short, with long fossorial claws. The tail is short, and the ears are rudimentary.

RATHBORNE, ST. GEORGE (1854). author; *b.* at Covington, Ky. Educated in the Cincinnati High Schools. Author of: *Baron Sam, Captain Tom, Colonel by Brevet, Dr. Jack, Dr. Jack's Wife, The Fair Maid of Fez, A Fair Revolutionist, The Girl From Hong-Kong, A Goddess of Africa, The Great Mogul, Her Rescue from The Turks, Major Matterson of Kentucky, Miss Caprice, Miss Fairfax of Virginia, Miss Pauline of New York, Monsieur Bob, Mrs. Bob, The Nabob of Singapore, A Son of Mars, The Spider's Web, Squire John, Under Egyptian Skies, A Captain of the Kaiser, Saved by the Sword, Chums of the Prairie, The Man from Wall Street*, 1905; *Young Fur Takers*, 1912; *The Rocky Mountain Boys, A Chase for a Bride, A Warrior Bold.*

RATHENOW (52° 37′ N., 12° 20′ E.), town, on Havel, Brandenburg, Prussia; spectacles and optical instruments. Pop. 24,000.

RATHLIN, isl., co. Antrim, Ireland (55° 18′ N., 6° 13′ W.), 6 m. N. of Ballycastle; is of crescent shape, 7 m. by 1½ m.; at N.E. end are ruins of castle in which Robert Bruce took refuge, 1306; scene of traditional story of the spider. Pop. 350.

RATHOM, JOHN REVELSTOKE (1868-1923), editor, author; *b.* in Melbourne, Australia. Educated at Scotch College, Melbourne and Harrow, Eng. War correspondent in Soudan and Cuba and was a member of the Bunbury expedition to New Guinea, 1888, and Schwatka's Alaska expedition in 1890. A staff correspondent, managing editor and general manager since 1912 of a Chicago paper. Was an authority on sociological and immigration subjects. Commander of the Crown of Italy and Chevalier of the Order of Leopold, Belgium. Since 1917, director and member of the executive committee of the Associated Press.

RATIBOR, Polish Raciborz (50° 6′ N., 18° 13′ E.), city, on Oder, Silesia, Prussia; steel and iron manufactures. Pop. 38,000.

RATIO, the measure of the relation which one quantity bears to another of the same kind; that is, it is the number of times that one quantity contains another regarded as a standard. This is found by dividing the one by the other. The quotient or ratio thus obtained is the proper measure of the relation of the two quantities. See ARITHMETIC; MATHEMATICS.

RATION, a fixed amount or quantity dealt out; an allowance. The term is usually employed to indicate the allowance of provisions given to soldiers in the army and sailors in the navy.

RATIONALISM, in wide sense, revolt of individual reason against authority; in narrower, the attempt to deduce geometrically all knowledge from certain elementary concepts (Descartes, Spinoza, Leibniz). Kant denied the validity of this mathematical method; rational concepts to yield new truths must be applied to matter of sense given in experience.

RATISBON. See REGENSBURG.

RATLAM (23° 21′ N., 75° E.), native state, Malwa, Central India. Pop. 87,000. Capital, Ratlam. Pop. 37,000.

RATLINES. See SAILS AND RIGGING.

RATNAGIRI (16° 59′ N., 73° 20′ E.), district, Bombay, India. Pop. 1,200,000. Capital, Ratnagiri, on Arabian Sea. Pop. 16,500.

RATTLESNAKE. See SNAKES AND SERPENTS.

RAUCH, CHRISTIAN DANIEL (1777-1857), one of the most noted sculptors of the 19th century, *b.* at Arolsen, Waldeck. His crowning work was the colossal monument of Frederick the Great in Berlin, an equestrian statue in bronze surrounded by groups of generals and soldiers. Other important works are the statue of Albrecht Dürer in Nuremberg, and statues of Blücher, Luther, and Schiller.

RAVAILLAC, FRANÇOIS (1578-1610), a French fanatic. Of humble origin, he was for a time a schoolmaster, but was imprisoned for bankruptcy. He was soon dismissed as a visionary from the order of the Feuillans. An ardent supporter of the Roman Catholic League, he was moved by fanaticism to become the assassin of Henry IV. 1610, for which he was torn asunder by horses.

RAVEN. See under CROW FAMILY.

RAVENEL, WILLIAM DE CHASTIGNIER (1859), naturalist; *b.* at Pineville, N. C. In 1878 graduated from Union College, New York. In 1883 entered the United States Fish Commission and was chief special agent of the Chicago Exposition in 1893. Represented the Fish Commission on government board of management at expositions at various places from 1895-1904. Represented the Smithsonian Institution, International [Marine Exposition, France, 1907. In 1909 a member of the United States Government Board, Seattle. From 1895-1902, assistant in charge of fish culture, United States Fish Commission. Acting commissioner from 1897-1902 of Fish and Fisheries.

RAVENNA (44° 25′ N., 12° 12′ E.), chief town, R. province, Italy; surrounded by wall with five gates; communicates with Adriatic Sea by Corsini canal.

R. was seat of government of Rom. emperors in V. cent., and was taken by Theodoric in 493; recovered by Rome in 539; subsequently belonged to Lombards and then to Franks, from whom it passed to pope. Pop. 74,000; (prov.) 256,600.

Ravenna, Exarchate of, lands of Byzantine empire in Italy, 568-751, ruled by exarch (new form of prætorian prefect), whose capital was at Ravenna. Exarch was appointed at close of VI. cent. to command all Rom. troops in Italy against Lombards; submitted to Lombard king, Astulf, 751; granted to Papacy by Pippin, 754.

RAVENNA, a town of Ohio, in Portage co. Its industries include the manufacture of iron and carriages. Pop. 1920, 7,219.

RAVENSBURG (47° 46′ N., 9° 37′ E.), town, on Schussen, Württemberg, Germany; textiles. Pop. 16,800.

RAVI (32° N., 74° 50′ E.), river, Punjab, India; joins Chenab.

RAWA RUSKA, tn., Galicia, Ukraine (50° 18′ N., 23° 39′ E.), 32 m. N. N. W. of Lemberg; during the World War was captured by the Russians, Sept. 14, 1914; lost in their great retreat, June, 1915. Pop. 10,400.

RAWALPINDI (33° 36′ N., 73° 3′ E.), division, Punjab, India. Pop. 562,000. Capital, Rawalpindi. Pop. 86,500.

RAWITSCH, Polish Rawicz (51° 37′ N., 16° 50′ E.), town, Posen, Prussia; snuff. Pop. 11,000.

RAWLINS, JOHN AARON (1831-1869), Civil War general; *b.* East Galena, Ill.; *d.* Washington, D. C. He was trained as a lawyer, and though knowing nothing of military science, became General Grant's closest and most trusted adviser throughout the Civil War. A vigorous war speech he made in 1861 on behalf of the Union, following the attack on Fort Sumter, attracted Grant, who invited him to join the Union forces as a captain. Later he became Grant's chief of staff and brevet brigadier-general of regulars. In Grant's first administration he served as Secretary of War for a brief period.

RAWLINS, JOSEPH LAFAYETTE (1850), ex-senator; *b.* at Salt Lake county, Utah. Took classical course at Indiana University but did not graduate. From 1873-1875, professor at the University of Deseret, Salt Lake City and in 1875 admitted to the bar. Since 1875 practiced in Salt Lake City. United States Senator from 1897-1903.

RAWLINSON, SIR HENRY CRESWICKE (1810-95), Brit. soldier, archæologist, and politician; distinguished in Afghan War, 1842; consul at Bagdad, 1844; carried out Assyrian and Babylonian excavations.

RAWLINSON, HENRY SEYMOUR, 1ST BARON (1864), British general; educated at Eton and Sandhurst. Participated in Sudan and S. African Wars and commanded Mobile Column, 1901-02. Subsequently commanded 2nd Brigade, Aldershot, and 3rd Brigade, Salisbury Plain. During 1914 he led the famous but ill-fated 7th Division to Belgium in pursuance of the scheme for holding back the Germans on the line of the Scheldt. With the exception of a short period when attached to the Allied War Council at Versailles, he remained in high command during the whole of the war. His crowning exploit was in the great Brit. offensive of 1918, when, with the 4th Army, he carried Brit. arms across the old battlefield of the Somme and the Hindenburg Line, this being instrumental in effecting the Ger. collapse. For his distinguished services he was awarded a peerage and a grant of $150,000, Aug., 1919.

RAWLINSON, SIR ROBERT (1810-98), Eng. engineer; began life as a stonemason, then engineer; app. to Sanitary Commission to inquire into condition of troops in Crimea.

RAWMARSH (53° 27′ N., 1° 21′ W.), town, Yorkshire, England; ironworks; collieries. Pop. 17,000.

RAWSON, CHARLES A. (1867), senator and manufacturer; *b.* at Des

Moines, Iowa. Educated in high school and Grinnell College. Since 1886 manufactured clay products. Director of banks and trust companies. From 1912-22, chairman of the Republican State Central Committee. In 1922 appointed a member of the United States Senate to succeed a member who had resigned.

RAWSON, EDWARD KIRK (1846), a professor in the United States Navy; *b.* at Albany, New York. In 1868 he graduated from Yale College and in 1872 from Andover Theological Seminary. Ordained a Congregational minister in the same year. He was chaplain of the United States Navy, 1871-90 and of the United States Naval Academy, 1886-90. From 1880-90 head of the department of ethics and English studies at the Naval Academy and from 1902-07, head of the department of English and law. Retired in 1908 on account of age.

RAWTENSTALL (53° 42′ N., 2° 18′ W.), town, Lancashire, England; cotton and woolen industries. Pop. 1921, 38,-980.

RAY, ANNA CHAPIN (1865-1922), author; *b.* at Westfield, Mass. In 1885 graduated from Smith College. Author of : *Half a Dozen Boys*, 1890; *Half a Dozen Girls*, 1891; *The Cadets of Fleming Hall*, 1892; *In Blue Creek Canyon*, 1892; *Margaret Davis, Tutor*, 1893; *Dick*, 1896; the *Teddy Books*, 1898-1904; *Each Life Unfulfilled*, 1899; *Playground Toni*, 1900; *The Dominant Strain*, 1903; *Sheba*, 1903; *By the Good Sainte Anne*, 1904; *On the Firing Line* (with Hamilton Brock Fuller), 1905; the *Sidney* books, 1905-10; *Hearts and Creeds*, 1906; *Ackroyd of the Faculty*, 1907; *Quickened*, 1908; *The Bridge Builders*, 1909; *Over the Quicksands*, 1910; *A Woman with a Purpose*, 1911; *Buddie*, 1911; *The Brentons*, 1912; *Buddie at Gray Buttes Camp*, 1912; *On Board the Beatic*, 1913; *The Responsibilities of Buddie*, 1913; from 1916-20, head of print room, Department of Soldiers Civil Re-Establishment, Ottowa, Canada.

RAY, JOHN, WRAY (1628-1705), Eng. naturalist; the 'father' of Eng. natural history; famous for his contributions especially to the science of bot. He demonstrated the ascent of sap in plants; classified them according to their cotyledons; was also author of several zoological works.

RAYLEIGH (JOHN WILLIAM STRUTT), 3RD BARON (1842-1919), Eng. physicist; prof. of physics, Cambridge, 1879-84, and of natural philosophy at the Royal Institution, 1887-1905; president of the Royal Soc., 1905; did important work in the evaluation of the fundamental electrical units, in optics and capillarity, on Boyle's Law at low pressures; his very careful determination of the densities of gases led to the discovery (with Ramsay) of the element argon in the atmosphere; awarded the Nobel prize for physics, 1904; wrote *Theory of Sound*, 1877-88, and numerous monographs collected in *Scientific Papers* (4 vols. 1903).

RAYMOND, BRADFORD PAUL (1846-1916), an American educator, *b.* near Stamford, Conn. He entered Hamline University, Minnesota, in 1866, and when it closed for lack of funds in 1869 he hired the buildings and conducted the college to the close of the year. Studied theology and was pastor of various Methodist churches at New Bedford, Mass., Providence, R. I., and Nashua, N. H. President, 1883-89, of Lawrence University and of Wesleyan University, 1889-1908. Professor at Wesleyan after 1909 of ethics and biblical literature.

RAYMOND, GEORGE LANSING (1839), educator, author; *b.* in Chicago, Ill. In 1862 he graduated from Williams College. In 1870 ordained a Presbyterian minister. Professor at various colleges. Author of: *Colony Ballads*, 1876; *Ideals Made Real*, 1877; *Orator's Manual*, 1879; *Modern Fishers of Men*, 1879; *A Life in Song*, 1886; *Poetry as a Representative Art*, 1886; *Ballads of the Revolution*, 1887; *Sketches in Song*, 1887; *The Genesis of Art-Form*, 1893; *Pictures in Verse*, 1894; *Rhythm and Harmony in Poetry and Music*, 1895; *Painting, Sculpture and Architecture as Representative Arts*, 1895; *Proportion and Harmony of Line and Color in Painting, Sculpture and Architecture*, 1899; *The Representative Significance of Form*, 1900; *The Aztec God, and Other Dramas*, 1900; *Ballads and Other Poems*, 1901; *The Essentials of Aesthetics*, 1907; *Psychology of Inspiration*, 1908; *Dante and Collected Verse*, 1909; *Fundamentals in Education, Art and Civics*, 1911; *Suggestions for the Spiritual Life*, 1912; *Ethics and Natural Law*, 1920.

RAYMOND, HENRY JARVIS (1820-1869), New York editor and Civil War politician; *b.* Lima, N. Y.; *d.* New York City. After graduating from the University of Vermont and studying law, he became assistant editor of the New York Tribune upon its establishment in 1841 by Horace Greeley. Between 1849 and 1854 he was a State assemblyman, and served as speaker and lieutenant-governor. He established the New York Times in 1851 and

by his writings helped conspicuously to raise the prevailing tone of journalism. In 1861 he was again in the state legislature and speaker of the Assembly and was elected to Congress in 1864. He was a leading influence in the organization of the Republican party.

RAYMOND, JEROME HALL (1869), university lecturer; *b.* Clinton, Iowa. He was educated at Northwestern and Chicago Universities and began his educational work with lectures in University Extension courses. From 1894 to 1912 he was successful lecturer on or professor of sociology, economics and political science at various scholastic institutions. In 1914 he became lecturer in political science at the University of California.

RAYMOND, JOHN T. (1836-1887), actor; *b.* Buffalo as John O'Brien. He attained great popularity for his impersonation of Colonel Mulberry Sellers in a stage version of Mark Twain's *Gilded Age*, produced in 1871 and had previously become notable as *Asa Trenchard* in *Our American Cousin* with E. A. Sothern in the cast as *Lord Dundreary*. His best depictions were broad, humorous character types.

RAYMUND IV. OF TOULOUSE, COUNT OF PROVENCE (*d.* 1105) prominent leader in First Crusade; disputed with Bohemund possession of Antioch, 1098; vainly sought to establish himself in rival city at Arca; refused offered dignity of advocacy of Holy Sepulchre, however, being unwilling to rule where Christ suffered; commenced conquest of Tripoli, afterwards Provencal countship.

RAYMUND, PRINCE OF ANTIOCH (1099-1149), selected by Fulk, king of Jerusalem, to marry infant heiress of Antioch, 1130; constant struggles against Gk. emperor; typical mediæval Fr. noble.

RAYNAL, ABBÉ DE GUILLAUME THOMAS FRANÇOIS (1713-96), Fr. author; wrote on eve of Fr. Revolution with assistance of various noted men, *Establishments and Commerce of the Europeans in the Indias*, 1770, a compilation with political aim.

RAYNALD OF CHATILLON (*d.* 1187), second husband of Constance, princess of Antioch; defeated Saladin, 1177, and after many times breaking faith with him, suffered death at his hands.

RAYNAUD'S DISEASE, a disease usually affecting women in early adult life, of nervous origin, predisposed to by cold.

RAYNER, EMMA, author; *b.* in Cambridge, England. Educated privately and graduated from University of Cambridge, England. From 1892-1902 on staff of an American magazine. Author of: *Free to Serve*, 1897; *In Castle and Colony*, 1899; *Visiting the Sin*, 1900; *Doris Kingsley, Child and Colonist*, 1901; *Handicapped Among the Free*, 1903; *The Dilemma of Engeltie*, 1911.

RAYS (*Batoidea*), group of Selachian fishes with flattened bodies, large pectoral fins, ventral gill-openings, and often a long whip-like tail. Most common are the Skates, found in temperate and colder seas, 9 species of which are Amer., best known being the Common Skate (*Raia batis*), up to 6 ft. long, and the Thornback (*R. clavata*), up to 3 ft. The Sting Rays and Eagle Rays—armed with a strong spine up to 6 or 8 in. long, placed at the base of the tail, and capable of inflicting grievous wounds—are represented by *Trygon pastinaca* and *Myliobatis aquila* respectively. Even an Electric Ray, *Torpedo hebetans*, with strong, muscular, electric battery hidden between head and pectoral fin, has not infrequently been found. The Saw Fishes (*Pristis*), however, are confined to tropical seas, where, with the strong flat-toothed blade which continues the snout, they do much havoc among their brethren.

RAYS, ALPHA. See RADIOACTIVITY.

RAYS, BETA. See BETA RAYS.

RAZGRAD (43° 30′ N., 26° 30′ E.); town, Bulgaria; active agricultural trade. Pop. 14,000.

RAZINE, STEPHEN TIMOFEEVICH (*d.* 1671), Russ. rebel Cossack; seized Jaik (Ouralsk), 1667, and pillaged ships navigating Volga and Oural; gathered large band of discontented men, and captured town after town; driven back from Simbirsk, 1670, and captured.

RAZORS. To produce a good razor it is necessary to use the finest steel procurable for the blade; hollow-ground razors, first made in Germany, are the finest samples of the grinder's art, and are lighter and more economical than the flat ground variety. These are now hollowground largely by machinery, only a slight amount of finishing being done by hand. Razors are hafted in ivory, celluloid, vulcanite, etc. The safety razor, in which the blade is held in a guide which prevents the skin puckering in front of the edge, greatly reduces the risk of wounding, and has become very popular.

RAZOR-SHELL (*Solen*), a genus of widely distributed lamellibranch molluscs with very elongated shells, the

valves of which are widely open at both ends, and are almost straight. The foot is powerful and highly developed; it can be pointed or contracted for boring with great rapidity into sand, and with it can retain so tight a hold that the foot often has to be torn off before the creature can be removed. *S. siliqua* and *S. ensis* are British. Both are edible, and though, now not much eaten, were considered a delicacy by the ancient Greeks.

RAZOR BILL. See GUILLEMOT FAMILY.

RE, ILE DE, RHÉ (46° 11′ N., 1° 25′ W.), island, Charente-Inférieure, France; unsuccessfully besieged by English, 1627. Pop. 14,500.

REA, GEORGE BRONSON (1869), an American electrical engineer; *b.* in Brooklyn, N. Y. He was educated by private tutors and then went to Cuba. At the beginning of the Revolution there he accompanied the insurgents as special correspondent of a New York paper. He was present at bombardment of Porto Rico and San Juan as correspondent for another New York paper. He also traveled through Cuba as a secret agent of the United States, obtaining much valuable information. He was the author of *Facts and Fancies About Cuba.*

REA, PAUL MARSHALL (1878), museum director; *b.* at Cotuit, Mass. In 1899 graduated from Williams College. From 1900-02 at Williams College as assistant in biology and from 1903-14 professor of biology at the College of Charleston. A director in 1903-20 of the Charleston Museum. From 1906-11, instructor in the Marine Biological Laboratory and in 1911-19 professor of embryology and physiology, 1919-20 professor of embryology at Medical College of South Carolina. Since 1920 director of the Cleveland Museum of Natural History. Author of *Directory of American Museums,* 1910; various papers on educational and museum work.

REA, SAMUEL (1855), railroad president; *b.* Hollidaysburg, Pa. He entered the service of the Pennsylvania Railroad in the engineering department when 15 years old and became construction engineer on various branches. Later he acted as chief engineer for the Baltimore and Ohio Railroad in constructing its belt line and tunnel under Baltimore. In 1892 he returned to the Pennsylvania system and became its president in 1913. The University of Pennsylvania in 1910 awarded him its degree of Sc.D. for his part in directing the road's extension to New York City through Hudson river tunnels and the building of the railroad's great terminal in that city.

REACTION. See CHEMISTRY; PHYSICS.

READ, GEORGE WINDLE (1860), army officer; *b.* in Indianola, Iowa. Graduated from the United States Military Academy in 1883 and in the same year commissioned a second lieutenant. In 1891 a first lieutenant and 1899 a captain. Promoted to major in 1910 and inspector-general in 1911. In 1914 lieutenant-colonel and adjutant-general; colonel, 1916; brigadier-general, National Army, 1917, and major-general regular army, 1921. For four years professor of military science and tactics at the University of Iowa and the next four years in service at Texas. In Cuba, Philippine Islands and California and Hawaii, then a confidential mission abroad from 1898-1904. From April until October, 1908, governor of the Province of Pinar del Rio. In World War commanded the American Embarkation Center at Le Mans, France, 1918. Decorated by the French, English and American governments.

READ, JOHN MEREDITH, JR. (1837-1896), an American diplomat and writer; *b.* in Philadelphia, Pa. Graduated in 1858 from Brown University, and in 1859 at the Albany Law School. Admitted to the bar and from 1860-66, Adjutant-General of New York State. He was the first United States Consul-General to France and Algeria and in 1873 became Minister to Greece. Author of: *Charles Reade at Home,* 1873; *Historic Studies in Vaud, Berne, and Savoy, from Roman Times to Voltaire, Rousseau and Gibbon,* 1897.

READ, OPIE (1852), an American author; *b.* at Nashville, Tenn.; *s.* of Guilford and Elizabeth Wallace Read. He was educated at Gallatin, Tenn. He edited the Arkansas Gazette, 1878-81, was on the staff of the Cleveland Leader, 1881-83, established and operated the Arkansas Traveler, 1883-91, after which he was engaged in literary work in Chicago. Author: *Old Lim Jucklin,* 1905; *'Turkey Egg' Griffin,* 1905; *The Mystery of Margaret,* 1907, and others.

READ, THOMAS BUCHANAN (1822-1872), poet and artist; *b.* Chester co., Pa.; *d.* New York. In 1843 he settled in Boston as a self-taught portrait painter after a neglected boyhood and wanderings about the country painting signs, reporting, tailoring, making cigars, and following other occupations for a livelihood. Later he went to live in Rome, joining the art colony there. Among his portraits were those of Mrs.

Browning, the ex-Queen of Naples, Longfellow, Longfellow's children and George Peabody, the last named being at the Institute in Baltimore. He was more notable as a poet, especially for his *Sheridan's Ride* and *Drifting*, which were great popular favorites in their day, one as a recitation, the other as a song.

READE, CHARLES (1814-84), Eng. novelist; *b.* at Ipsden, Oxfordshire. His first works were dramatic, and include *Masks and Faces* (or *Peg Woffington*), *Christie Johnstone*, and *Peregrine Pickle*. His novels include *It's Never Too Late to Mend* (a study of prison life), *The Cloister and the Hearth* (his masterpiece, dealing with the life of the father of Erasmus), *Hard Cash* (a study of asylum life), *Put Yourself in His Place* (dealing with Trade Unionism).

READING (51° 27′ N., 0° 59′ W.), county town, Berkshire, England, at junction of Kennet and Thames; has a Univ. Extension College; fine municipal buildings, several interesting churches, and the remains of a XII.-cent. Benedictine abbey; biscuit factories; iron foundries; occupied by the Danes in 871; by Parliamentarians in 1643. Pop. 1921, 92,600.

READING, a city of Massachusetts, in Middlesex co. It is on the Boston and Maine Railroad. It has important industries, including the manufacture of organ pipes, carriages, boots and shoes, rubber, etc. There is a public library. Pop. 1920, 7,424.

READING, a city of Pennsylvania, in Berks co., of which it is the county seat. It is on the Pennsylvania and the Philadelphia and Reading railroads, and on the Schuylkill river and the Schuylkill canal, 58 miles northwest of Philadelphia. It is an important industrial and commercial city. Here are the railroad and machine shops of the Philadelphia and Reading. There are also foundries, iron and steel works, stove works, hat factories, brick and tile works, cigar and cigarette factories, and planing mills. The city is well laid out on a site which rises in picturesque hills. There are two parks and several charitable institutions, including three hospitals, several dispensaries and a home for orphans. The city has over 60 churches and about 50 school buildings. There are over 500 manufacturing establishments. Pop. 1920, 107,784.

READING (RUFUS ISAACS), 1ST EARL OF (1860), lord chief justice of England, 1913; Q.C. in 1898 and made great reputation; Liberal M.P. for Reading, 1904-13; solicitor-general, 1910, and attorney-general, 1910-13. His knowledge of finance was of great service during the war crisis, and he was sent to the U. S. A. on special missions, being high commissioner and special ambassador to U. S. A., 1918; Viceroy of India in 1920.

REAGENT. See CHEMISTRY.

REAL, a Spanish silver coin worth a quarter of the 'peseta' or franc which is still current in Mexico and other old Spanish possessions. The Portuguese R. is valued at forty reis.

REAL PROPERTY is distinguished from '*personal*' property by the fact that it can be recovered by law when in the hands of a false owner. Freehold estates, rights over minerals, and landed property generally is 'real' property. The greatest estate which a person can hold is the fee simple, and it arises where land is given 'to a person and his heirs.'

REALISM (Modern), theory that reality exists apart from consciousness. R. in lit. is opposed to romanticism; it shows life as it is, not as an idealist wants it to be. Among realists are Zola, Guy de Maupassant, Tolstoi, Gorki, Upton Sinclair (in *The Jungle*). Ibsen's influence has given R. a strong position in modern drama.

REAM, a quantity of paper consisting of 20 quires of 24 sheets each.

REAPING-MACHINES have now almost completely replaced sickle and scythe as a means of cutting standing crops. The reaping-machine consists of a long iron comb carried horizontally a few inches above the ground, on which works a cutting knife which is like a very coarse saw with sharpened teeth. The comb holds the stalks in position, while the saw cuts them. In older forms the cut cereal was removed by a hand-rake, but now a *binder* is generally added to the reaper, and this automatically binds the cereal into sheaves and throws them out at the side of the machine.

REASON.—(1) mind as drawing or capable of drawing inferences; (2) mind as apprehending or capable of apprehending systematic truth; (3) mind as the source of system and order.

RÉAUMUR RENÉ ANTOINE FERCHAULT DE (1683-1757), Fr. naturalist and physicist; discovered production of steel from iron, iron tinning, production of opaque glass, artificial incubation, etc.; constructed thermometer with temperature scale bearing his name.

REBAB, RABAB, probably the oldest of stringed instruments. According to some authorities, it originated in Arabia,

and was brought thence to Spain in the VIII. cent.; others suggest that by the conquest of Spain it became known to the Arabians. It was played with a bow, and but for the absence of deep curved indentations, and the peculiar form of the resonance box, might be regarded as an early violin.

REBATE, an allowance or reduction of price made for prompt payment, etc. Rs. of customs duties are granted on damaged goods, and gas and water companies often distribute some of their profits in the form of a R. of the rates charged. See RAILWAYS.

REBECK, REBEC, ancient stringed instrument of the violin kind played with a bow, in use during the Middle Ages; introduced by the Moors into Spain; rendered obsolete by violin.

REBELLION. See CIVIL WAR, AMERICAN.

REBELLION, in England 'The Great R.' is the struggle between Charles I. and Parliament; in Scotland 'The R.' means the Jacobite revolt of 1715 and 1745.

REBUS, an enigmatical representation of some phrase, name, or thing, by pictures or words. The same name is given in heraldry to a coat-of-arms which forms a play on its bearer's name.

RECALL. See ELECTORAL REFORM.

RÉCAMIER, JEANNE FRANÇOISE JULIE ADÉLAÏDE (1777-1849), Fr. leader of society; wife of banker, Jacques R.; presided over famous *Salon de l'-Abbaye-au-bois*; reputation not of wit but physical perfection and elegance and strong influence; celebrated portrait by David in Louvre.

RECANATI (43° 24′ N., 13° 31′ E.), city, Macerata, Italy; cathedral. Pop. (commune) 17,000.

RECEIPT, a written discharge of a debtor on payment of money due, or an acknowledgment in writing of having received a sum of money or other valuable consideration.

RECEIVER. A R. is an individual appointed in certain cases by a court of equity upon the application of creditors, or other interested parties, to receive income and pay debts. The court can appoint a R. whenever it appears to be just or convenient to do so.

RECHABITES, 'Sons of Rechab' (*Jeremiah* 35:6), Total Abstinence Friendly Soc.

RECHBERG-ROTHENLÖWEN, JOHANN BERNHARD, COUNT (1806-99), Austrian statesman; minister of foreign affairs, 1859-64, and minister pres., 1859, at moment of great Austrian weakness.

RECIFE, PERNAMBUCO (8° S., 35° 53′ W.), city, seaport, capital of Pernambuco state, Brazil, on Atlantic; consists of three parts, Recife, San Antonio, and Boa Vista, separated by narrow channels and connected by bridges; contains government buildings, naval and military arsenals, hospital, theatre, observatory; manufactures cotton; exports sugar. Pop. 216,000.

RECIPROCAL. If a quantity be represented by a/b, its R. is b/a. Tables of the Rs. of the common numbers are prepared for mathematical calculations; in this case the R. of n is $1/n$.

RECIPROCITY. Meaning in economics, concessions between nations by which tariffs are regulated, or abolished. An early example was the treaty between the United States and Great Britain in 1815, by which each party agreed that duties on the others shipping and cargoes should not be higher than those levied on their own shipping. This applied only to direct trade, while shipping from a third nation was not included. In 1828 the discrimination was removed. Free trade in some things was established between the United States and Canada in 1854, but was abrogated in 1866. Canada attempted to obtain a reciprocity treaty in 1866, 1869, 1875, 1890, 1892 and 1911. The McKinley Tariff Act of 1890 admitted sugar, tea, coffee, molasses and hides free, excepting from countries that imposed heavy duties on United States goods. The reciprocity agreement under this Act was ended by the United States in 1894. The Dingley Act of 1897 contained reciprocity provisions and agreements were made with France, Germany, Italy and Portugal. An important feature was that for reciprocal concessions 20 per cent., or less, reductions would be made in tariff rates on products of the United States. In 1903 all duties on Cuban goods were reduced 20 per cent., Cuba reducing the tariff on American goods 20 to 40 per cent. The Payne Tariff Act of 1909 abrogated reciprocity with other countries, except Cuba, and a maximum and minimum tariff was substituted. In 1910 the president, by proclamation, extended the minimum rate to all nations. The Underwood Bill, including a section authorizing the president to negotiate reciprocal agreements with foreign countries, to be submitted for approval to Congress, was passed in October, 1913.

Reciprocity between the United States

and Canada was proposed by the American government during the administration of President Taft, but the plan was rejected by Canada. The reciprocity law remained on the statute books until the passage of the present American Tariff in September, 1922. A proposal for Tariff reciprocity was made in the Canada House of Commons, May 11, 1923.

RECKLINGHAUSEN (51° 40′ N., 7° 13′ E.), town, Westphalia, Prussia; collieries; manufactures linen. Pop. 53,000.

RECLAMATION, restoration to fertility by drainage of lands under water and conversely by the addition of water to lands that are arid. Vast projects of the kind have been carried on under governmental auspices in Holland, Egypt, Spain, India and other countries, and millions of acres of otherwise worthless land have thus been made susceptible of cultivation.

The United States Reclamation Service was created by an act of Congress June 17, 1902, for the purpose of surveying, constructing and operating works for the irrigation of arid and semi-arid lands. The necessity for this arose from the fact that in the Western two-fifths of the United States, a large part of the land is under public ownership and is so arid that little of it is suitable for agriculture. Individual effort could accomplish little because of the vastness of the territory in question, and it became evident that Government resources would have to be invoked in order to make the land available for agriculture. The funds necessary for the work of the Reclamation Service were provided for by setting aside the proceeds from the disposal of public lands. This revenue amounted to over $5,000,000 annually and to this has been added a Government loan of $20,000,000. The organization has five supervising engineers, each in charge of work in a group of states where the climatic conditions are similar. Projects involving over 3,000,000 acres are now under operation, and in addition to this 1,100,000 acres under private control get stored water from the Government reservoirs. The Service has built over 14,000 miles of canals, ditches and drains; 100 storage and diversion dams have been constructed with an aggregate volume of 14,500,000 cubic yards. Some of the more notable of these are the Roosevelt Dam and canals in Arizona, the Arrowrock Dam in Idaho, the Elephant Butte Dam in New Mexico and the Gunnison Tunnel in Colorado. Over 100 tunnels have been built, 1,000 miles of road, 83 miles of railroad, 3,280 miles of telephone lines and a dozen power plants. Over 450,000 persons are living on the 33,000 farms irrigated by the Service and in the project towns and cities. Water is furnished annually to 1,227,500 acres, and from these crops produced annually that are worth over $50,000,000. Under the present law, soldiers of the World War have a preference right to enter farms that are on the projects which are open for settlement from time to time as canals are extended to make irrigation water available. Up to June 30, 1922, $135,000,000 had been expended in the construction work of the Service.

RECLUS, JEAN JACQUES ELISÉE (1830-1905), Fr. geographer; for several years a prof. at Brussels. The greatest of his works is the *Nouvelle Geographie Universelle* in 17 vol's.

RECOLLET FRIARS or **NUNS,** the name given to a reformed body of Franciscans. It was founded in Spain and spread throughout Europe. The order still exists.

RECONNAISSANCE (Fr. *reconnaitre,* from Lat. *recognoscere,* to recognize), a military term denoting the examination of the enemy's position or movements or of the ground occupied. 'Tactical' and 'strategical' Rs. are carried out by squadrons, which send forward patrols and scouts to find the enemy and note his movements, etc. When a large body of men is employed, with the object of inducing the enemy to show his hand, the operation is termed a 'reconnaissance in force.' Topographical Rs. have for their object the securing of information on the peculiarities and details of the position, hills, rivers, cover, etc., and are carried out by skilled officers and men. The term R. is also applied to the preliminary surveying operations preparatory to the building of a railway, canal, etc.

RECONSTRUCTION (following the Civil War). Term applied to the methods adopted for bringing back the seceded States into the Union. The problem had not been foreseen by the makers of the Constitution, or at any rate no provision for its solution is contained in that document. The matters involved were those relating to the seceded States as political entities, the population of those States and the negroes. The solution was made the more difficult because the passions stirred up by the war had not subsided.

At the outset there was a conflict between the executive and legislative branches of the Government. President Lincoln and his successor, Andrew Jack-

son, believed that the power to prescribe conditions for the admission of the seceded States into the Union was vested in the executive; Congress emphatically thought otherwise. The Lincoln plan was that a State should be recognized when 10 per cent. of those who were voters in 1860 had taken oath to support the Constitution of the United States. On this basis many States organized, formed legislatures and elected representatives and senators who were promptly refused congressional seats when they presented their credentials. Congress in 1864 passed the Wade-Davis bill along lines radically different from those of the President. Lincoln defeated this measure by refusing to sign it before the end of the session. Following President Lincoln's assassination, Johnson took up his policy only to have it rejected by Congress. The latter ignored the whole scheme and appointed a joint committee of fifteen members to inquire under what conditions the States in question should be entitled to representation in Congress. This committee recommended that guarantees for the protection of the civil rights of the negro should be required and that a proportion of those who had participated in the Rebellion should be disfranchised and made ineligible for office. In February of 1866 the first of the Reconstruction Acts was passed. This grouped the late insurrectionary States into five military districts, each of which was placed under the command of an army officer. The State Governments were declared to be provisional only. This gave rise to much oppression and many abuses. By 1870 most of the state conventions had adopted constitutions establishing negro suffrage, and having complied with this condition were restored to their full positions in the Union. The enfranchisement of the negro made it possible for that race to gain possession of the government in most of the Southern States, and their rule was one of gross extravagance, corruption and inefficiency. Northern white adventurers took advantage of conditions to migrate to the South and gain control of much of its natural resources and political power. The result was the so-called 'Carpet-Bag' regime which taxed, defrauded and impoverished the people. This unbearable condition of affairs gave rise to the Ku Klux Klan, a secret organization of whites which was of some service in repressing and punishing the excesses of the blacks but frequently degenerated into a mere instrument of abuse and tyranny. The intolerable situation was gradually realized by the North as well as the South, and the Government at Washington showed a growing disposition to leave the Southern State governments to take care of themselves. By 1870, the Democrats, who represented the white element had regained control of North Carolina, Texas, Georgia, Virginia and Tennessee. In 1874 Alabama and Arkansas put an end to the carpet-bag governments; Mississippi followed suit in 1875 and in the following year the remaining Southern States were 'reclaimed' from negro domination. Since that time the white element has remained in control, often through the aid of constitutions that by subterfuges ensured the disfranchisement of the negroes.

RECONSTRUCTION IN EUROPE. After the World War Europe set herself the task of political, social and industrial reorganization and of undertaking housing and public improvements deferred by the war, making good her human wastage by recuperation and re-education and restoring the conduct of government, life and industry to normal functions. The process became impeded by the deadlock between the Allied powers and Germany on Reparations. For some years after the war Europe was at the mercy of economic evils originating in the condition of its governments' finances. Governments issued paper money because they could not balance their budgets, and they could not balance their budgets because of their huge war debts, for the paying of which reliance was placed on the reparations to be extracted from Germany. The continued indiscriminate issues of paper so influenced currencies that no one knew the value of money and industry became badly adjusted. In 1922 five countries went on a paper debauch — Russia, Germany, Poland, Austria and Hungary. They went to extremes in monetary inflation without any gold backing worth the name. Russia multiplied her paper money of 1921 forty times in 1922. Germany's paper currencies in 1922 were thirty-six times greater than in 1921. The inflations of Poland, Austria and Hungary were relatively modest by comparison. The remaining countries of Europe, figured on a unit basis, expanded their note circulation only 10 per cent in 1922. The situation halted the adjustment of prices of commodities, as the buying power of Europe could not be measured so long as most of her currencies remained debased and subject to daily fluctuating in value. It is true that industry became restored generally almost to the old footing in the post-war period, but the degradation of currencies in so many of the countries

resulted in such maladjustments that the industrial gains were obscured. Up to 1924 no European government had balanced its budget with the exception of Great Britain, not even the neutrals. Great Britain finally discarded German reparations even as a potential asset; she wrote reparations off as bad debts and balanced her budgets without them. France and the other affected countries, counted on reparations as a real asset, and the former borrowed money from her own people on the strength of that asset. The outlook was that the economic reconstruction of Europe would have to proceed by drastic retrenchments in government administration, such as by the policies adopted by the Fascismo government of Italy, and by Austria and Czechoslovakia, rather than by dependence on German reparations.

RECORD, or **COURT OF RECORD.** A court of R. is one 'where the acts and judicial proceedings are enrolled on parchment for a perpetual memorial and testimony' (Blackstone). The distinguishing mark of a court of R. is the power to inflict fines and to attack a person for *any* contempt of court; while the practical effect of the distinction between courts of R. and those not of record is that the rolls and records of a court of R. are incontestable evidence of what purports therein to have been done, whereas the proceedings of courts not of record must be proved like any other question of fact.

RECORDER, obsolete beak-flute, something like a flageolet, with six or seven holes. It is referred to in a famous scene in *Hamlet.*

RECTANGLE, a quadrilateral plane figure of which the angles are all right angles and the opposite sides equal. The area of a rectangle is equal to the product of two adjacent sides.

RECTIFICATION, in chemistry, the process of purifying volatile spirits by fractional distillation; they are then known as rectified spirits.

RECTOR, a clergyman who enjoys the benefices of the parish where the tithes are not impropriate.

RECTUM. See DIGESTION.

RECUSANT, in English history, one refusing to attend Established Church; R. C. and Puritan r's were punished from Elizabeth's reign onwards; latter relieved by Toleration Act, 1689, former by Emancipation Act, 1829.

RED. See PIGMENTS.

REDAN, a field of fortification which is the simplest kind employed. It consists of two parapets of earth, raised to form a salient angle with the apex toward the enemy.

RED BANK, a town of New Jersey, in Monmouth co. It is on the Pennsylvania and the Central of New Jersey railroads, and on the Shrewsbury river, 26 miles south of New York City, with which it has regular steamboat connection. Its industries include the manufacture of gold leaf, carriages and canned goods. There is also a large trade in fishing and oysters. During the World War an important industry was the manufacture of uniforms for the United States Army. The town has a public library. Pop. 1920, 9,251.

RED BIRD, a popular name given in various countries to birds of such colored plumage, like the cardinal bird, the scarlet tanger, East Indian minivet and the English bullfinch.

REDCAR (54° 37′ N., 1° 4′ W.), watering-place, Yorkshire, England. Pop. 1921, 16,399.

RED CEDAR. See CEDAR.

RED CLOUD (1820-1909), a famous chief of the Sioux Indians, and the last of the great chiefs of that nation. He was the leader in a number of raids against the whites in Wyoming, and became a terror in that region. After the battle of Wounded Knee, in 1890, he and his followers fled to the hills. He was captured and spent his later years at Pine Ridge Agency, where he died.

RED CROSS, philanthropic organization whose general rules were drafted by an international conference which met at Geneva in 1863. The conference agreed upon a treaty for the purpose of alleviating the evils inseparable from war, and recommended the formation in every country of a committee to cooperate with the hospital staff of armies in times of conflict. Forty-four nations, including the United States, ratified the treaty, and a flag and badge were adopted upon each of which was a Geneva red cross on a white ground. Since that time the work of pity and helpfulness carried on by the society has been immeasurably beneficent. The organization achieved wonderful results in the Russo-Turkish War; the Boer War; the Russo-Japanese War and especially in the colossal World War.

The American branch, organized in 1881 as the American National Association of the Red Cross and re-incorporated in 1893 and 1900, took the name of the American Red Cross in 1905. The scope of the American Red Cross is all-embracing. The relief of war sufferers is

only one branch of its activities. In addition to that, it carries on a system of national and international relief in time of peace, and seeks to mitigate the sufferings caused by pestilence, famine, fire, floods, explosions and other national calamities. Its services have been invaluable in the yellow fever epidemic in Florida, 1887, the Johnstown Flood, 1889, the Galveston Flood, 1900, the San Francisco Earthquake, 1906, and on numberless lesser occasions. It lent great assistance in the Spanish-American War, and as an adjunct to the American Army Hospital service in the World War was one of the most valuable auxiliaries of the Government. In the latter struggle it received contributions of $400,000,000, had as active workers 8,100,000 persons, distributed 371,577,000 relief articles produced by volunteer workers, aided 500,000 families of soldiers by home service in the United States; donated 10,900,000 articles of clothing to soldiers and sailors in the United States service; served 15,376,000 at Red Cross canteens in France and shipped 101,000 tons of relief supplies over seas. These figures only indicate but do not by any means exhaust the number and character of Red Cross activities. Since the war its work has been continued abroad among helpless populations in over twenty-five countries. The headquarters of the organization are at Washington, D. C. Its present peace membership is about 5,000,000 and in addition 5,000,000 junior members.

RED CURRANT. See CURRANT.

REDDITCH (52° 18′ N., 1° 56′ W.), town, Worcestershire, England; needles, fish-hooks. Pop. 15,500.

REDESDALE, JOHN FREEMAN-MITFORD, LORD (1748-1830), Eng. lawyer; wrote valuable *Pleadings in Suits in the Court of Chancery by English Bill*, 1777; attorney-general, 1799-1801; speaker, 1801-02; chancellor of Ireland, 1802-06; lord of trade, 1808.

REDFERN, suburb of Sydney, New South Wales, Australia; iron and railway works. Pop. 26,000.

REDFIELD, EDWARD WILLIS (1869), artist; *b.* at Bridgeville, Del. Pupil at the Pennsylvania Academy of Fine Arts. Awarded prizes at the following expositions: Gold Medal, Art Club of Philadelphia, 1896; bronze medal, Paris Exposition, 1900; Buffalo Exposition, 1901; Temple gold medal, Pennsylvania Academy of Fine Arts, 1903; 2nd Hallgarten prize, National Academy, 1904; gold medal, Pennsylvania Academy of Fine Arts, 1905; Fisher prize and Corcoran bronze medal, Corcoran Gallery of Art, Washington, 1907; Potter Palmer gold medal and 1st prize; Art Institute of Chicago, 1913; gold medal and 1st prize Carnegie Institute, 1914; Altman prize, 1919; N. A. D. Stotesbury prize, Pennsylvania Academy of Fine Arts, 1921.

REDFIELD, ISAAC FLETCHER (1804-1876), an American jurist; *b.* at Wethersfield, Vt. In 1825 he was graduated from Dartmouth College and practiced law in Derby and Windsor, Vt. He was made a judge of the Supreme Court in 1835 and in 1852 became chief-justice, retiring in 1860. He was the author of *The Law of Carriers and Bailments*, 1869.

REDFIELD, WILLIAM C. (1858), Secretary of Commerce; *b.* at Albany, N. Y.; *s.* of Charles Bailey and Mary Wallace Redfield. He was educated at Pittsfield, Mass., High School. He was officially connected with various industrial enterprises, was a member of the 62nd Congress, 1911-13, 5th New York District, and was Secretary of Commerce in the Cabinet of President Wilson, 1913-19, after which he retired. Author: *The New Industrial Day*, 1912.

RED JACKET (1751-1830), an Indian chief of the Seneca tribe so called because of a red jacket he wore, the gift of a British officer. His native name was Sagoyewatha. His tribe was allied with the British in the Revolutionary War, but in the War of 1812 he espoused the American side. Washington presented him in 1792 with a silver medal, which he always wore, upon the signing of a treaty of peace between the United States and the Six Nations, of which the Senecas were one. He was a great Indian orator. His later life became marred by intemperance and was passed in the Seneca Reservation, where he died.

REDLANDS, a city of California, in San Bernardino co. It is on the Santa Fe and the Southern Pacific railroads. It has important industries but is chiefly known as a popular summer resort. It is the seat of the University of Redlands and has a public library and several parks. It is the center of one of the most extensive orange producing regions in the world. Its other industries include the manufacture of brick and lumber products. Pop. 1920, 9,571.

RED MEN, IMPROVED ORDER OF, a fraternal society which retains aboriginal American traditions and customs in its organization and ritual. It had its beginnings in revolutionary times and in the Society of Red Men organized in 1813 in Philadelphia. The

present body dates from 1833. Among the order's aims is the perpetuation of the legends and history of the aboriginal Indians with their customs and names. The society has its tribes, it meets in wigwams, its members are warriors or chiefs, and it has a Great Chief of Records. Its membership in 1922 was about 480,000.

REDMOND, JOHN EDWARD (1851-1918), Irish politician; was called to the Eng. bar, 1886; entered Parliament as member from New Ross, 1881; then represented N. Wexford, 1885-91, and, from 1892, Waterford city; on the death of Parnell, 1891, was chosen as leader of his followers, and in 1900 became leader of the reunited Irish Nationalist party. Mainly owing to his efforts the Home Rule Bill of 1914 was successfully carried; during the World War he did much to stimulate recruiting in Ireland.

RED OAK, a city of Iowa. Pop. 1920, 5,578.

RED RIVER, the most southerly tributary of the Mississippi, rising in northwestern Texas from a number of headwaters in the Llano Estacado. It flows east through canyons from an altitude of 2,450 feet, forms the boundary between Texas and Oklahoma on the north, enters Arkansas, turns southeast through Louisiana, and finds its junction with the Mississippi 341 miles above the latter's mouth. Its navigable length is about 1,250 miles and it drains an area of 97,000 square miles. Shreveport, La., is the head of navigation for large vessels.

RED RIVER OF THE NORTH, rises in northwest Minnesota from the sources of the Mississippi, flows south for some 100 miles through a chain of lakes, turns west and north, separating Minnesota from North Dakota, and continues northward into Manitoba, where it empties into Lake Winnipeg. It penetrates the Red River Valley, a great level plain and a famous wheat-producing region. Length, about 750 miles.

RED RIVER SETTLEMENT (50° 20′ N., 98° W.), Scot. colony; founded, 1812, on Red River of the north, near Winnipeg, Canada.

RED SEA (24° N., 38° E.), an extension of Ind. Ocean, passing north-westward, between Arabia and Africa, towards Mediterranean, with which it connects by Suez Canal; opens off Gulf of Aden by Strait of Bab-el-Mandeb; at N. end breaks into two arms, Gulf of Suez on W., Gulf of Arabia on E.; water very salt, owing to great amount of evaporation; coral reefs along both shores; length, *c.* 1,300 miles.

REDSTART. See under THRUSH FAMILY.

REDUCTIO AD ABSURDUM, informal logic, an indirect demonstration founded upon the impossibility of a contradictory supposition. Euclid constantly employed this mode of indirect reduction to the proof of his geometrical propositions.

REDUCTION, CHEMICAL. The withdrawal of oxygen from a compound. In other words, the exact opposite of the process of oxidation. It will be seen that whenever reduction occurs, it is inevitable that oxidation should take place simultaneously, because the agent bringing about reduction must itself become oxidized by the oxygen which it withdraws. An example will make this clear. Iron may become oxidized by exposure to the atmosphere. If the iron oxide (rust) be now heated in a current of hydrogen, the oxide is reduced to iron because the hydrogen withdraws the oxygen from it, but the hydrogen in so doing, will become oxidized to water. The term oxidation and reduction are now used in a wider sense covering reactions which do not necessarily involve gain or loss of oxygen. For instance, the conversion of mercuric chloride to mercurous chloride, and finally to mercury, by the action of stannous chloride is a process of reduction. Reduction, therefore, in its widest sense, includes the passage of a compound from a higher to a lower state of oxidation, either by the removal of oxygen or of an acidic atom or radicle; or by the addition of hydrogen or an equivalent basic atom or radicle.

REDWAY, JACQUES WARDLAW (1849), geographer; *b.* near Murfreesboro, Tenn. Educated at the Universities of California and Munich. Instructor at the University of California in chemistry and professor of physical geography and chemistry at the State Normal School of California. In 1870-80, engaged in mining engineering and exploration in Arizona and California. Author of: *Manual of Geography*, 1887. Joint author of: *Natural Geographies*, 1897, 1907; *New Basis of Geography*, 1901; *Commercial Geography*, 1902; *Making of the Empire State, Inquiry Concerning the First Landfall of Columbus, The Treeless Plains of North America, Making of the American Nation*, 1906; *Elementary Physical Geography*, 1907; *All Around Asia*, 1909; *Redway School History*, 1910. Editor: *Sir John Mandeville's Travels*, 1899; *Kinglake's Eothen*, 1899; *Observers Handbook of Meteorology*, 1920.

REDWING, a city of Minnesota, in

Goodhue co., of which it is the county seat. It is on the Chicago, Milwaukee and St. Paul, and the Chicago, Great Western railroads, and on the Mississippi river. The city has a very large trade in wheat, which is its chief article of export. It has also manufactures of flour, steam engines, agricultural machinery, lumber, doors, sashes and blinds. It has a public library and a city hospital, and is the seat of the Hage Seminary, State Training School and Redwing Seminary. Pop. 1920, 8,637.

REDWING. See under THRUSH FAMILY.

REDWOOD. See SEQUOIA.

REED, DAVID AIKEN (1880), United States Senator; *b.* in Pittsburgh, Pa. He graduated from Princeton in 1900 and from 1903 to 1917 he practiced law in Pittsburgh. He served in the World War with the 311th Field Artillery and resumed the practice of law in Pittsburgh in 1919. He was elected United States Senator in 1922.

REED, ELMER ELLSWORTH (1862), college president; *b.* at Fairfield, Iowa. In 1884 graduated from Parsons College. In 1888 ordained a Presbyterian minister. Was pastor at Kirksville, Iowa, 1888-91; Griswold, 1891-95; Atlantic, 1895-1900. In 1900-06, president of Buena Vista College, Storm Lake, Iowa. President of Lenox College, Hopkinton, Iowa, 1906-15, and succeeded in raising $225,000 for the college. Since 1915, president of Westminster College, Missouri. Raised $500,000 for this college erected two buildings and half of another $500,000 already collected.

REED, GEORGE MATTHEW (1878), plant pathologist; *b.* at Ingleside, Pa. Graduated from Geneva College in 1900. From 1900-03, professor at Amity College of natural science and assistant in botany; 1904-07, instructor; 1907 at the University of Wisconsin. At the University of Missouri as assistant professor of botany, 1907-12, and professor, 1912-18. In 1919-20, pathologist in charge of the cereal smut investigation of the United States Department of Agriculture. Since 1921 with the Brooklyn Botanic Garden. Author of many papers on plant pathology.

REED, HELEN LEAH, author; *b.* at St. John, New Brunswick. In 1890 graduated from Radcliffe College, and in the same year first winner of the Sargent prize (Harvard) for metrical translation from Horace. Author of: *Miss Theodora,* 1898; *Brenda, Her School and Her Club,* 1900; *Brenda's Summer at Rockley,* 1901; *Brenda's Cousin at Radcliffe,* 1902; *Brenda's Bargain,* 1903; *Irma and Nap,* 1904; *Amy in Arcadia,* 1905; *Brenda's Ward,* 1906; *Napoleon's Young Neighbor,* 1907; *Irma in Italy,* 1908; *Serbia, a Sketch,* 1916; *Memorial Day and Other Verse,* 1917. Wrote for periodicals.

REED, JAMES A. (1861), a United States senator; *b.* near Mansfield, Ohio; *s.* of John A. and Nancy Reed. He was educated at district schools and at Coe College, Iowa. He was admitted to the bar in 1885 and after practicing at Cedar Rapids for 2 years, removed to Kansas City where he was identified with local and state Democratic politics after 1888. He was United States senator for 2 terms, 1917-23, then resumed as senior member of the firm of Reed & Harvey, Kansas City.

REED, JOSEPH (1741-85), Amer. soldier and politician; pres. of Pennsylvania Convention, 1775; adjutant-general of Washington, 1776; pres. of Pennsylvania, 1778.

REED, THOMAS BRACKETT (1839-1902), an American statesman; *b.* in Portland, Me. He graduated from Bowdoin College, in 1860, studied law, went out to California in 1863 and was admitted to the bar there. During the Civil War he served as a paymaster in the Navy, returning to his native city after the war. In 1868 he was elected to the state legislature as a Republican, where he served two years. He was also a member of the state senate for two years, and for a time was state attorney-general. In 1876 he was elected to Congress, where he served continuously for 23 years. For many years he was Speaker of the House, and by his knowledge and force of personality raised that office to a position second only to that of the President. As a Republican he was in favor of protection and opposed to free silver, but in the matter of the imperialism which followed the Spanish-American War was opposed to his party, his resignation in 1899 being partly due to this difference of opinion. In 1896 he was nearly nominated presidential candidate by the National Republic Convention, coming next to McKinley with 84 votes.

REED COLLEGE, an educational institution situated at Portland, Ore., and founded in 1910. It had a student roll of 300 and a teaching staff of 30 in 1922, under the presidency of R. F. Scholz.

REED INSTRUMENTS, distinguished from instruments in which the tone is produced by strings or by blowing into an open tube, are those in which the sound is obtained by means of a reed. In instruments like the clarinet

and oboe the reed is placed within a tube; in those like the harmonium and concertina no tube is required. The two classes are known respectively as *beating* and *free* reeds.

REEF (old Nor. *rif*), a chain or range of rocks lying at or near the surface of the water.

REEF. See CORAL.

REEFING, the operation of reducing the area which the sail of a ship presents to the wind.

REES, ABRAHAM (1743-1825), a Welsh author; was a zealous and very philanthropic Nonconformist minister in Old Jersey, London. He edited an encyclopædia of forty-five volumes.

REESE, LOWELL OTUS (1866), writer; *b.* at Lindon, Ind. Educated in the public schools. Removed to California. In 1894 a teacher of a brass band and from 1894-1900 a mining prospector. From 1900-06, a feature writer of Los Angeles papers. In 1906 went East and since 1916 wrote for magazines.

REESE, THEODORE IRVING (1873), bishop; *b.* in New York. Graduated from Columbia College in 1894. 1898, ordained a minister of the Protestant Episcopal Church. Founder and first rector from 1897-1907 of St. Michael's Parish, Milton, Mass., and from 1907-13, rector of Trinity Church, Columbus, Ohio. In 1912, elected bishop coadjutor of Diocese of Southern Ohio and in 1913 consecrated.

REEVE, ARTHUR BENJAMIN (1880), author; *b.* at Patchogue, N. Y. Graduated from Princeton College in 1903. Author of: *The Silent Bullet*, 1912; *The Black Hand*, 1912; *Poisoned Pen*, 1913; *Adventures of Craig Kennedy, Scientific Detective*, in a magazine from 1910-18 and since 1922; *Great Cases of William J. Burns*, 1912-13; *The Dream Doctor*, 1914; *Guy Garrick*, 1914; *The War Terror*, 1915; *The Exploits of Elaine*, 1915; *The Gold of the Gods*, 1915; *Constance Dunlap*, 1915; *The Romance of Elaine*, 1916; *The Social Gangster*, 1916; *Ear in the Wall*, 1916; *Treasure Train*, 1917; *The Adventuress*, 1917; *The Panama Plot*, 1918; *The Soul Scar*, 1919; *The Master Mystery*, 1919; *The Master Mind*, 1920; *The Film Mystery*, 1921. Collaborated on motion picture serials with other men and produced *The Exploits of Elaine*, 1914-15; *The Hidden Hand, The House of Hate, Tiger's Trail, The Houdini* serial, *The Master Mystery, The Carter Case, One Million Dollars Reward, The Grim Game, Terror Island.*

REEVES, JOHN SIMMS (1818-1900), Eng. tenor; studied at Paris and Milan; best tenor of his time.

REFERENDUM. See INITIATIVE AND REFERENDUM; ELECTORAL REFERENDUM.

REFLECTION. See LIGHT.

REFLECTOR. See TELESCOPE.

REFINING, COPPER. See COPPER.

REFLEX ACTION See NERVOUS SYSTEM.

REFORMATION, the eccles. revolution in the 16th cent. by which a considerable number of European states severed themselves from the R. C. church and adopted some form of Prot. belief and organization. Germany was the scene of the first decisive action; it commenced with Luther's attack on the sale of indulgences, and developed in such a way that in two years the attention of W. Europe was concentrated upon the quarrel between him and the papacy. Luther was excommunicated, and in 1521 the Diet of Worms placed him under imperial ban; then came the Diet of Spires, and the protest which gave the reformers a new and lasting name, the Confession of Augsburg, 1530 in which their creed was set forth, the Peace of Augsburg, 1555, and the Thirty Years' War, in which Protestants had again to struggle for existence.

Meanwhile, in Switzerland, an independent movement, nearly contemporary with that of Luther, was headed by Zwingli, which issued in the Treaty of Kappel, each canton being allowed to determine its own religion. But this movement was overshadowed in importance by the rise of John Calvin. Zwingli's work was carried on in Zurich, Calvin's in Geneva. The new religion had been received in the town some years before Calvin took up residence there; in the efforts to throw off the yoke of the Catholic Dukes of Savoy, the town was compelled to join with Protestantism, and Calvin threw himself into this work with characteristic zeal, and became the guide and eventually the dictator of the Prot. Church there.

Thus by the middle of the 16th cent. Protestantism had produced two Church organizations—one, Lutheranism, commending itself to those states which adopted the Reformation under the guidance of kings and under the influence of political motives; the other, Calvinism, supplying its creed and organization to those Prot. Churches which had to struggle for their existence against persecution and repression.

These influences spread to the whole of Christendom. Denmark and Sweden declared for Protestantism. In France the Reformation did not assume a

national character. The movement was of native growth. The new faith had many adherents, but the Reformation failed, and by the revocation of the Edict of Nantes, in 1685, Protestantism in that country was extinguished.

In England the separation from Rome became an accomplished fact in 1532, its origin and course being to a large extent determined by the monarchy and political considerations. Henry VIII. carried through Parliament a series of measures which severed the Eng. Church from Rome and established the ecclesiastical supremacy of the crown; doctrinal Protestantism, however, was checked by him. Under Edward VI. progress was made; a reaction followed under Mary; Elizabeth repudiated the papal authority, and in 1571 the creed of the Church was determined by promulgation of the Thirty-nine Articles. In Scotland the Reformation gave rise to prolonged strife, but eventually triumphed; the efforts of the Church to extinguish the new worship were in vain. Knox returned from exile, and in 1560 Protestantism was recognized as the religion of the country. Ireland was regarded by Henry VIII. as a dependent province; he was declared supreme head of the Irish Church, and various changes were effected; Roman Catholicism was restored by Mary; with Elizabeth, Protestantism was established, but the mass of the people adhered to the old faith.

Thus Protestantism prevailed for the most part among the Teutonic peoples of N. Europe, and its influence was felt even in those countries where it was never formally adopted.

REFORMED CHURCH, CHRISTIAN. See CHRISTIAN REFORMED CHURCH.

REFORMED CHURCH IN THE UNITED STATES, formerly the German Reformed Church, founded and developed by immigrants from Germany and Switzerland during and after the 18th century. Some of these went to Virginia, where the first congregation was founded in 1714. A greater number sprang up in those parts of Pennsylvania settled by the 'Pennsylvania Dutch.' The denomination bears the same relation to the established churches of Northern Europe that the Presbyterian Church holds in regard to the High Church of England. In 1863 a General Synod was formed, corresponding to the general assembly of other Protestant churches. In 1921 this denomination had 344,374 members and 1,719 churches, the majority of which were in Pennsylvania.

REFORMED CHURCHES, those bodies of Continental Protestants who are not Lutheran (*i.e.*), Calvinistic.

REFORMED CHURCHES IN AMERICA, THE COUNCIL OF, a body through which are united seven denominations, constituting the reformed churches in this country. The Council was formed in 1906 and includes the Reformed Church of America, the Presbyterian Church in the United States of America, the Presbyterian Church in the United States, the Reformed Church in the United States, the United Presbyterian Church, the Associate Reformed Presbyterian Synod, and the Cumberland Presbyterian Church, Colored.

REFORMED EPISCOPAL CHURCH, a religious denomination founded in New York, in 1873, by a number of members of the Protestant Episcopal Church, under the leadership of Bishop David Cummins, of Kentucky, as a protest against ritualism. In 1921 it had 74 churches affiliated with 11,050 members. It supports six missionaries in India, and maintains a theological seminary and 17 primary schools in Philadelphia, as well as two hospitals and an orphanage. Its organ is the Episcopal Recorder, published in Philadelphia.

REFORMED PRESBYTERIANS. See PRESBYTERIANS.

REFORM SCHOOLS. See JUVENILE COURTS.

REFRACTION. See LIGHT.

REFRIGERATION, the cooling of a substance by the transference of some of its heat to another and cooler substance. Refrigerating machines may be divided into two main classes, liquid machines and compressed air machines. One machine of the former class depends upon the fact that the boiling-point of water varies according to the pressure. Water is placed in an air-tight vessel connected with a vacuum pump, and the pressure is lowered until the water boils. The heat required for evaporation is abstracted from the water, and as the pressure is reduced further and further, the temp. gradually falls to the freezing-point, and ice is formed. In other machines, liquids more volatile than water, such as ammonia, carbonic acid, or ether, are employed as the refrigerating agent. The principle of these machines is much the same as that of the water machine, except that the refrigerating agent is recovered by compressing the vapor. Still another type of liquid machine makes use of the fact that certain vapors are capable of being absorbed in water, and separated again by heat.

Compressed-air machines consist essentially of three chambers—for compression, cooling, and expansion respectively. Air is drawn into the first

chamber and compressed. It is then cooled by passing through the cooling chamber, and finally it enters the expansion chamber. Here it is allowed to expand to atmospheric pressure, and during this expansion it is made to perform mechanical work by pressing upon a piston. The air thus loses heat equivalent to the energy expended upon the piston.

Refrigeration machines are used for the production of ice for domestic purposes, and on a commercial scale in special ice factories, and for cooling the air in rooms for the cold storage of meat. They are used also in dairies and breweries, for cooling the magazines on warships, and to some extent for cooling the air blast for blast furnaces. On vessels for the transport of meat, ammonia or carbonic acid machines are chiefly used, though some ships still use the compressed-air machine. The water vacuum machine is employed principally in making ice for domestic use.

REFUSE. See GARBAGE, DISPOSAL OF.

REGALIA (neuter plural of Lat. *regalis*, royal), emblems of royalty, which are crown, sceptre, sword, ring, bracelets, robe, orb, cross, spurs, etc.

REGATTA. See ROWING.

REGENCY, government by deputy. The Brit. sovereign has the prerogative of appointing a regent or lords justices to rule during his absence from the realm or his own or heir's infancy. The question as to the powers of Parliament arose when George III. went mad. The Regency Act, 1910, appoints Queen Mary regent in case one of her children accedes to the throne before attaining the age of 18.

REGENERATION, a theological term used to denote the change by which one is admitted to the Church. All Christian churches are agreed as to its necessity, and base the doctrine on the words of Christ to Nicodemus: 'Except a man be born again (*or* from above) he cannot see the kingdom of heaven.' The Catholic Church teaches that in the case of all infants and of those adults who do not resist the divine grace, R. is the inseparable accompaniment of baptism. Most Protestants, on the other hand, make R. a sensible change of heart and life, not necessarily connected with any external rite.

REGENERATION OF LOST PARTS, reproduction of a part lost through disease or injury, frequently associated with the power of first casting off the part so damaged; exhibited in very different degrees by different animals, but generally more highly developed where the organism is less complex: a sea-cucumber can regrow fresh viscera, a worm a new head or tail, a crab a new limb, a lizard a new tail, but in man regeneration is exceedingly limited.

REGENSBURG, RATISBON (Gallic *Radaspona*, Rom. *Castra Regina*) (49° 1′ N., 12° 6′ E.), city, on Danube; capital of Upper Palatinate, Bavaria; contains Gothic cathedral founded 1275; other notable buildings are the abbey of St. Emmeran, church of St. Ulrich, Schottenkirche, Golden Cross Inn, and town hall (seat of Imperial diets, 1663-1806); has active transit trade; iron and steel manufactures; suffered in the Thirty Years and other wars; annexed by Bavaria in 1810. Pop. 1920, 52,510.

REGENT, one who exercises the power of sovereign during the absence of, or owing to the incapacity of, the sovereign.

REGGIO DI CALABRIA (38° 8′ N., 15° 39′ E.) (ancient *Rhegium*), town, on Strait of Messina; capital of province of same name, Italy; manufactures perfumes. Pop. 43,000; (province) 469,000.

REGGIO NELL' EMILIA (44° 42′ N., 10° 38′ E.) (ancient *Regium Lepidi*), city, capital of province of same name, Italy; cathedral; manufactures silk goods. Pop. 75,000; (province) 326,500;

REGICIDE (Lat. *Rex, regis*, king. *caedere*, to kill).—(1) one who kills a king. (2) one of those who sat in the tribunal which sentenced Charles I.

REGILLUS (41° 50′ N., 12° 42′ E.), lake, Latium; scene of victory of Romans over Latins, 496 B. C.

REGIMENT (Late Lat. *regimentum*, from *rego*, to rule), the largest permanent unit of an army. The development of the R. may be dated from the 16th century, when armies were permanently organized in companies and Rs. The earliest form of organization both of cavalry and infantry was in companies, each of which carried its own banner long after they were organized into Rs. As warfare became more scientific, the battalion and the squadron were introduced as the fighting formations of infantry and cavalry respectively. At first battalions were composed of many Rs., and were gradually reduced till they formed only fractions of a R. Finally, Rs. were made of uniform strength, and the battalion became a fixed fraction of a R.

REGINA, city, cap. Saskatchewan, Canada (50° 25′ N., 104° 38′ W.),

357 m. W. of Winnipeg; provincial legislative buildings, mounted police barracks, city hall, and various educational establishments. Headquarters of Royal North-west Mounted Police; wholesale distributing center; foundries and machine shops, oil works, timber mills, etc. Has adopted municipal ownership of public utilities. In 1912 cyclone caused 200 deaths and did great damage. Pop. 26,000.

REGIOMONTANUS (1436-76), name adopted by Johann Müller, Ger. astronomer; prof. of astron., Vienna; compiled *Kalendarium Novum.*

REGLA, formerly seaport, province Havana, Cuba; now part of city of Havana. Pop. 16,000.

REGNARD, JEAN FRANÇOIS (1655-1709), Fr. dramatist; traveled in various countries; made a slave in Africa; his masterpiece, *Le Joueur*, appeared, 1696; one of most successful comic writers of classical school.

REGNAULT, HENRI VICTOR (1810-78), Fr. chemist and physicist; worked on organic chem., thermometry, expansion of gases, specific heats, hygrometry, steam-engines.

REGNIER, MATHURIN (1573-1613), Fr. satirist; typical poet of Renaissance; wrote 16 *satires* against bad poets, courtiers, hypocrites, and other permanent human types; many of his expressions have become proverbs.

REGNITZ (49° 40′ N., 11° E.), river, Bavaria; joins Main near Bamberg.

REGULUS, M. ATILIUS, Roman consul 267 B. C. In 256 he was consul a second time with L. Manlius Vulso Longus. The two consuls defeated the Carthaginian fleet, and afterwards landed in Africa with a large force. They first met with great and striking success, but in 255 R. was defeated and taken prisoner. Five years later the Carthaginians sent an embassy to Rome to solicit peace. They allowed R. to accompany the ambassadors on the promise that he would return to Carthage if their proposals were declined. He dissuaded the senate from assenting to a peace, and returning to Carthage he was put to death with the most excruciating tortures.

REGULUS, ST., ST. RULE (IV. cent.), legendary monk who carried bones of St. Andrew from Patras to St. Andrews.

REHABILITATION IN FRANCE. The World War of 1914-18 caused France a huge property loss to replace which the government up to the middle of 1923 had spent more than 60,000,000,000 francs of a gold value of at least $5,000,000,000. As summarized by official reports, the damage inflicted by the Germans included the complete or partial destruction of 3,524 towns, and the destruction of 1,172 post-offices, 2,671 telegraph stations, 34,741 telephones, 1,492 miles of double-track and 1,481 miles of single-track railways, 1,529 bridges, culverts and tunnels, 683 miles of canals, 32,748 miles of highways and 7,300 schools and colleges. The foregoing was classed as public property. The losses to private property included 265,000 houses and buildings completely destroyed, 300,000 severely damaged, 11,400 factories and mines destroyed, and 8,242,390 acres of land rendered unfit for cultivation. By April, 1922, more than 5,000,000 of these acres had been leveled, cleaned and ploughed. Practically all the highways, railroads, canals and telegraphs had been re-laid, most of the factories and workshops rebuilt, and hundreds of thousands of houses built or repaired in the devastated regions.

REHABILITATION OF DISABLED SOLDIERS AND SAILORS. The national government undertook the rehabilitation of incapacitated ex-service men who served in the World War of 1914-18, and assigned the task to the U. S. Veterans' Bureau. The work entailed vocational re-education and fitting the former war workers for remunerative occupations, as well as their restoration to health. In 1922, after four years' operations, the Veterans' Bureau announced that 100,000 ex-service men received tuition and supervision in acquiring a gainful trade at a cost to the government of $30,000,000 annually, and that hospital service and treatment, involving an outlay of $60,000,000 a year, was provided for 30,000 veterans. There were more than 5,000 beds available in government institutions for treating mental and nervous cases due to the war. The ex-service men in process of vocational training were scattered all over the country in educational institutions or workshops, learning one or other of 170 odd trades or professions open to them. The administration of the Veterans' Bureau became the subject of considerable criticism and there were nation-wide complaints that the rehabilitation work was loosely conducted. It was acknowledged that the medical and hospital facilities provided for the disabled were fairly satisfactory, but much of the training and rehabilitation, or what passed as such, was condemned as wasting the time of

many men by submitting them to four years' inadequate or unsuitable instruction. See PENSIONS.

REHAN, ADA (1860-1916), actress; *b.* Limerick, Ireland; *d.* New York. Her name was originally Crehan. Her parents brought her to the United States in her early childhood and at fourteen she made her first stage appearance in Newark while still at school. Her real debut began at Mrs. John Drew's theatre in Philadelphia, where she acted between 1873 and 1875. Afterwards she played in stock companies in Baltimore, Albany and Louisville. Her fame dated from her connection with Augustus Daly's celebrated New York stock company, beginning in 1879 and lasting till his death in 1899. She became a recognized star of international repute in a long series of old comedies Daly revived and also in a number of modern plays. Her later appearances were only occasional.

REHDER, ALFRED (1863), botanist; *b.* at Waldenburg, Sachs, Germany. Educated at the universities of Gottingen and Berlin. In 1898 came to America and was assistant from 1898-1918, curator Herbarium of Arnold Arboretum (Harvard University), 1918. Compiler of: *Bradley Bibliography*, 5 volumes, 1911-18. Wrote many papers on botany. On Arnold Arboretum expeditions to China discovered many new specimens of plants.

REHERD, HERBERT WARE (1869), college president; *b.* at Geneseo, Ill. In 1893 graduated from Parsons College and in 1897 ordained a Presbyterian minister. From 1897-1901 at Milan, Ill., the pastor of the 1st Church and at Detroit, 1901-06, pastor of Bethany Church. At Waterloo, Iowa, 1906-13 pastor of 1st Church. Since 1913 president of Westminster College. Under the auspices of the Presbyterian Board of Foreign Missions he made a trip around the world, 1911-12, studying missions. Joint author: *Around the World Studies and Stories of Presbyterian Foreign Missions*, 1912.

REICHENAU (47° 42′ N., 9° 5′ E.), island in the Untersee of Lake Constance, belonging to Baden.

REICHENBACH (50° 38′ N., 12° 17′ E.), town, kingdom of Saxony; textiles. Pop. 1920, 26,881.

REICHENBACH (51° 8′ N., 14° 45′ E.), town, province Silesia, Prussia, on Peile; scene of victory of Prussians over Austrians, 1762. Pop. 17,000.

REICHENBERG (50° 47′ N., 15° 3′ E.), town, Bohemia, Austria; cloth. Pop. 36,000.

REICHSTADT, DUKE OF. See NAPOLEON. II.

REICHSTAG. See GERMANY.

REID, DANIEL GRAY (1858), financier; *b.* at Richmond, Ind. Educated in the public schools. In 1874 started business as a clerk in a bank in Richmond and worked through all departments, becoming vice-president in 1895. In 1892 became interested in the tin plate industry and in 1895 organized a tin plate company. Organized many steel companies and was a director of many companies.

REID, HARRY FIELDING (1859), geologist; *b.* at Baltimore, Md. Graduated from Johns Hopkins University in 1880. At the Case School of Applied Science, Cleveland, professor of mathematics from 1886-89 and physics, 1889-94. A lecturer, 1894-96, at Johns Hopkins, and 1895-96, professor of physical geography at the University of Chicago. At Johns Hopkins University as associate professor, 1896-1901, professor of geological physics, 1901-11, and professor of dynamical geology and geography since 1911. Author of: *Parts VI, VII, VIII of Highways of Maryland*, 1899. Joint author: (with A. N. Johnson) *Second Report on the Highways of Maryland*, 1902. *Volume II of Report of California State Earthquake Investigation Commission*, 1910. On request of the President in 1915, appointed a. member of committee National Academy of Sciences to report on controlling the Panama slides. Went to Europe in 1917 to study scientific activity in warfare.

REID, OGDEN MILLS (1882), American editor; *b.* New York City. He graduated at Yale in 1904 and pursued post-graduate studies at the University of Bonn, Germany. In 1908 he was admitted to the New York bar, but in the same year entered journalism on the staff of the New York Tribune of which he became editor in March, 1913. He is a Republican in politics and was a presidential elector in 1912. He is connected as official with many business corporations.

REID, THOMAS (1710-96), Scot. philosopher; *b.* Strachan; prof. at Glasgow. Against Berkeley and Hume, R. affirmed doctrines of sense perception and of common sense; denied that objects are perceived through ideas.

REID, THOMAS MAYNE (1818-83) Irish writer of adventure stories, (*e.g.*) *The Rifle Rangers*, *The Scalp Hunters* *The Headless Horseman.*

REID, WHITELAW (1837-1912), American journalist and diplomat; *b.* Xenia, Ohio. He graduated at Miami University in 1856; was editor of the Xenia News, 1858-59; became a reporter for the Cincinnati Gazette in 1860; was Washington correspondent and, later, war correspondent for the same paper. From 1863 to 1866 he was Librarian of the House of Representatives. He became connected with the New York Tribune in 1868 and four years later had risen to the post of editor in chief. He was Minister to France, 1889-92, and in 1892 was candidate for Vice President on the Republican ticket, but was defeated. He represented his country abroad on many special missions, and in 1905 succeeded Joseph H. Choate as Ambassador to Great Britain, a post he held until his death. His publications include *Schools of Journalism*, 1870; *Town Hall Suggestions*, 1881; *Our New Duties*, 1899; *A Continental Union*, 1900.

REIDSVILLE, a city of North Carolina. Pop. 1920, 5,333.

REIGATE (51° 14′ N., 0° 12′ W.), market-town, Surrey, England. Pop. 1921, 28,915.

REIGN OF TERROR. See FRENCH REVOLUTION.

REIMARUS, HERMANN SAMUEL (1694-1768), Ger. philosopher; champion of natural religion; believer in purpose of Nature, and human blessedness in future life; denied reasonableness and morality of contents of Biblical lit.; argued that New Testament writers seek their own selfish ambitions.

REIMS, OR RHEIMS, tn., Marne, France (49° 15′ N., 4° 2′ E.), on riv. Vesle and Aisne and Marne Canal, 85 m. E. N. E. of Paris. History goes back to legendary times; was prosperous town when Cæsar invaded Gaul, and under empire was one of great centers of Lat. culture in Gallia Belgica. Clovis, the Frank, baptized here, 496; in 12th cent. pope formally acknowledged right of Archbishop of Reims to consecrate and crown kings of France; all but Louis IV. and Henry IV. were consecrated in the cathedral. Associated with Joan of Arc, who on July 17, 1429, handed over the keys of the city to the king and stood near the altar at the coronation ceremony.

Cathedral of Notre Dame (begun 1212) was one of finest Gothic edifices in Europe. Six hundred statues adorned triple portal of W. front, and over it were gorgeous rose-windows with exquisite amber-colored 13th cent. glass. Interior vast, but in perfect symmetry; magnificent tapestry by Gobelin (a native); clock with moving figures; flask of reputed holy oil with which Clovis was baptized. Other notable structures: archbishop's palace, Romanesque church of St. Remi (11th and 12th centuries), and Porta Martis (one of Roman gates). Prior to World War had important woolen manufactures; was headquarters of champagne industry; glass, cork, chemicals, machinery, paper, etc. Important ry. jn. In 1870 the city was entered by Prussian troops (Sept. 4), and held to ransom; evacuated Nov. 20, 1872. Forty-four years later Ger. advance troops again entered city, made large requisitions of material and of a million francs; organized pillage. Evacuated during Allied advance from Marne and entered by French, Sept. 13, 1914. Thereafter for nearly four years under Ger. fire. For history of battles in neighborhood, see WAR, THE WORLD. Ger. bombardment lasted from Sept. 4, 1914, to Oct. 5, 1918; bombs were frequently dropped; vicinity of cathedral was believed to be specially aimed at, and its ruin aroused the indignation of Christendom. In 1915 and 1916 it was struck a hundred times, but suffered most during April 15, 19, and 24, 1917, when twelve shells per hour were directed at it. Great havoc was caused on S. W. side; protective measures prevented its irreparable destruction; paintings, tapestries, carvings, and sculptures were removed to place of safety. Archbishop's palace and most of its rich collections were burnt in fire of Sept. 19, 1914; only great chimney-piece of palace proper remains. Most of the other important buildings suffered severely. Children attended underground schools and wore gas masks. A daily paper was pub. throughout the siege, though the printing house was wrecked by shell fire. The Pommery Cellars (11 m. of streets, squares, and boulevards lighted by electricity) gave shelter to many citizens and school classes during the war. Pop. 1921, 76,645.

REINACH, JOSEPH (1856), Fr. publicist and politician; chief editor of *Republique Francaise* from 1886, he vigorously opposed Boulanger. Elected deputy in 1889 and in 1893; was an energetic defender of Dreyfus. He served on the staff during the World War. Publications include *Gambetta Orateur*, 1884; *Le Ministere Clemenceau*, 1885; *Les Petites Catilinaires* (3 vols.), 1889, and *Historie de l'Affaire Dreyfus*, 1901-08.

REINACH, SALOMON (1858), Fr. archæologist; member of the Institute

of France; carried out researches in Asia Minor, Greece, and Tunis; publications include *Manuel de Philologie Classique*, *Apollo*, and (with Dr. James Gow) *Minerva*.

REINDEER. See under DEER FAMILY.

REINDEER LAKE, in Saskatchewan, Canada, 120 m. long by 25 m. broad; has an outlet through the Reindeer R. to Churchill R.

REINDEER MOSS, a finely branched lichen, *Calodonia rangiferina*, occurring on moors in America and N. Europe. It constitutes the principal food of the reindeer.

REINEKE FUCHS, old Ger. version of *Reynard the Fox*.

REINFORCED CONCRETE. See CONCRETE.

REINHART, CHARLES STANLEY (1844-96), American artist; *b.* Pittsburgh, Pa. He studied art at Paris and Munich, returning to this country in 1870. He was a facile and accomplished illustrator for magazines and his studies in black and white, as well as in oil and water colors, gained him a wide reputation. He exhibited frequently in this country and abroad. His Civil War scenes were notable. Among his works may be cited *Clearing Up*, 1875; *Gathering Wood*, 1877; *The Spanish Barber*, 1884; *Washed Ashore*, 1887, and *The Rising Tide*, 1888.

REINKENS, JOSEPH HUBERT (1821-96), bp. of Old Catholics of Germany, 1873.

REINSCH, PAUL SAMUEL (1870-1923), American diplomat; *b.* Milwaukee, Wis. He graduated at the University of Wisconsin in 1892 and later studied at Berlin, Rome and Paris. He was assistant professor of political science in the University of Wisconsin, 1899-1901, and full professor from 1901 to 1913. In the latter year he was appointed Envoy Extraordinary, and Minister Plenipotentiary to China and held that position for six years. Following his resignation he was counsellor to the Chinese Government. He served as U. S. delegate to Pan-American Congresses in 1906, 1909 and 1910. His publications include: *World Politics at the End of the 19th Century as Influenced by the Oriental Situation*, 1900; *Colonial Government*, 1902; *Colonial Administration*, 1905; *Intellectual Currents in the Far East*, 1911; *International Unions*, 1911, and *Secret Diplomacy*, 1922. He has contributed largely to historical and economic journals, and his books have been translated into Japanese, Chinese, Spanish, and German.

REISKE, JOHANN JACOB (1716-74), Ger. Arabic scholar; *b.* at Zörbig in Saxony. He early mastered Arabic; made his way to Warnerianum to study Arabic MSS. In 1746 he graduated M.D. The last decade of his life was mainly devoted to Greek.

REITBOK, REEDBUCK (*Cervicapra arundinaceum*), rare antelope found in the N. portion of Cape Colony; color, reddish ash-grey; tail, short and bushy; horns, 1 ft. long and ringed; height, 3 ft.

RELATIVITY OF KNOWLEDGE.—(*a*) Objects of knowledge are known not absolutely, but only in relation to other objects; with Green, all experience becomes a system of relations, and sensation has no part in its constitution. (*b*) We know things not as they are, but as they affect the percipient mind.

RELATIVITY, EINSTEIN THEORY OF. Albert Einstein first published his *Special Theory of Relativity* in 1905 when he was 27 years of age. Since then he has extended the theory so as to include gravitation, and this Generalized Theory of Relativity is held to be one of the profoundest achievements of the human mind. It is fully comprehended only by a small group of specialists, but the basic ideas on which it is built are readily understood. The theory maintains that motion, direction, and size are relative. For instance, a draughtsman will draw a line on a piece of paper, and to him the point of his pencil will appear to have moved in a straight line, say, 12 inches long. In the meantime, however, the earth has continued to revolve on its axis and also to move on its vast orbit around the sun. To an imaginary observer on some distant star, therefore, the pencil point will not move in a straight line, but will move on one curve due to the earth's spin, and on another due to its rotation round the sun. The movement and direction of the pencil point evidently depend upon the observer—they are relative. The theory further maintains that time and space are properties ascribed by men to objects, and that the size and shape of a body depend upon the speed and direction of its movements. Einstein discredits Newton's theory of gravitation, maintaining that 'gravity' is not a force but a property of space. Space, according to the theory is curved, and everything that moves through it moves in a curve. The sun moves around the earth because the space around the sun is so distorted by its presence that the path of least time through space is the one taken by the earth. Since matter dis-

torts space, it follows that a ray of light passing through such distorted space should deviate from a straight line. This has afforded a means of testing the theory. During a solar eclipse, stars whose light passed near the sun were photographed. The predicted deviation was found, thus verifying the Einstein theory. This was particularly true of the eclipse of 1922.

RELICS, objects held sacred because of their connection with the saints, such as parts of their bodies or instruments used at their martyrdom. Great veneration has been paid to r's in Catholic Christianity. It had its origin partly in the respect paid to the dead, partly in the idea of association by which sanctity was held to be communicated by a person. Among the most famous r's was the true cross which Helena, mother of Constantine the Great, believed she had discovered.

RELIEF, in sculpture or architecture, is the projection of a figure beyond the plane on which it is formed. Technically it is of three kinds, high, low, and middle, according to the degree of projection.

RELIEF, WAR AND POST-WAR. American relief agencies, both government and private, were the principal channels through which aid came to the European countries afflicted by ravages of the World War and the economic disorders that followed. Food relief on a large scale constituted a considerable item in the liabilities a number of these impoverished countries incurred with the United States (see DEBTS WAR). For example, of Poland's debt, $51,671,749 represented food supplies. For relief to Finland the United States' bill was $8,281,926. Czecho-Slovakia contracted a debt of $6,428,089 for American food supplies; Esthonia, $1,785,767; Latvia, $2,610,417; Lithuania, $822,136; and Russia, $4,465,465.

Famine visited the last named country among her other post-war calamities and the American Relief Administration, a government conducted organization augmented by private aid, came promptly to the front with an enormous quantity of relief stores, to stem the wide-flung devastation. In the middle of 1922, Herbert Hoover, chairman of this body, reported to President Harding that its 200 workers in Russia had conducted 15,000 kitchens and distributing stations, from which about 3,250,000 children and 5,300,000 adults—a total of 8,550,000—were fed. Medical supplies kept typhus, typhoid, smallpox and famine fever epidemics under measurable control. Millions were inoculated as a safeguard against such diseases and extensive sanitary measures were put in force. The Relief Administration used food, clothing and medical supplies to a volume of 788,878 tons and raised some $60,000,000 in money and supplies from various quarters. Of this amount $23,300,000 represented Congressional appropriations of government war and medical supplies and food and seed of the U. S. Grain Corporation, and $11,433,000 came from the gold supplies of the Soviet government. By the beginning of 1923 famine conditions had abated.

Another source of American relief to Europe was the American Committee for Devastated France, formed in 1918. In four years of the post-war period it sent to the denuded French regions donations and supplies approximating $2,000,000. Its prime object was agricultural rehabilitation. See REHABILITATION IN FRANCE.

Relief in the Near East, undertaken by American agencies, embraced chiefly the rescue and salvaging of needy children in Syria, Palestine, Turkey, Persia, Mesopotamia, and Russian Transcaucasia. The situation was aggravated by the post-war conflict between Turkey and Greece. The organization for Near East Relief was formed in 1919 and up to June, 1921, had spent almost $10,000,000 in providing thousands of orphanages, caring for home orphans, conducting hospitals, and giving industrial and direct relief to many thousands of adults.

The American Relief Administration, in addition to its famine relief in Russia, undertook child-feeding and general relief in 23 European countries, its more extensive operations being carried on in Austria, Armenia, Czecho-Slovakia, Constantinople, Danzig, Finland, Hungary, Jugo-Slavia, Esthonia, Latvia, Lithuania, Northern France, Poland and Roumania.

American aid in the restoration of Belgium included the complete rebuilding of the renowned library of the University of Louvain, destroyed by the Germans. The cost of the new structure, which was designed by Warren and Wetmore, American architects, to conform to the mediæval architecture of Louvain, was met by a popular subscription of $1,000,000.

RELIGION. A satisfactory definition of religion has not yet been found. Two things are chiefly required for a satisfactory definition: on the one hand, a statement which will differentiate religion from the allied forms of human thought, such as art or morality; on the other, a statement which is wide enough

to include all the forms which religion has taken, both in the form of subjective emotion and in the form of historical reality. Since we do not yet know all the forms which it has taken, every definition must be still only tentative. When man realizes that he forms part of a world order, the resultant feeling seems to be that which is the basis of religion. This leaves room for the feeble thought of the savage, and also includes all the forms which emotion can take, whether it results in moral conduct or in naturalistic fetishism.

The classification of religions is also still incomplete. Every classification is liable to ignore some unstudied form, or to rest on a theory of the origin or end of religion which is implicit in the mind of the classifier. We give two classifications, framed from different points of view. Hegel divides religions into (1) those of nature, which correspond to the childhood of humanity; (2) those of spirituality, which correspond to its youth; and (3) the absolute religion—that of Christ—which corresponds to its manhood. He further divides the religions of nature into (*a*) immediate religion, which includes such forms as sorcery and fetishism; (b) pantheism, which is subdivided into (i.) the religion of measure, of that of Confucius among the Chinese; (ii.) the religion of fantasy, or Brahmanism; (iii.) the religion of being in itself, or Buddhism; (*c*) religion of freedom, which is exemplified in or branches into those of light (Zoroastrianism), of sorrow (Syrian), and of mystery (Egyptian). The religions of spirituality are held to be those of sublimity, or the Hebrew; of beauty, or the Greek; of the understanding, or the Roman. The weakness of such a classification is that it fails adequately to recognize how each religion is not merely a stage in a general development, but has its own independent development. As a consequence, each religion is capable of being viewed from several points of view; and Hegel's classification occasionally leaves the impression that the point of view which suits his theory has been unduly pressed.

Professor Tiele makes a broad distinction between (1) nature and (2) ethical religions, according as man is wholly merged in or distinguishes himself from the world order. Nature religions are distributed into (*a*) magical religions which are dominated by animism, but which are still polydæmonistic; (*b*) magical religions which are purified into a polytheism which recognizes super-human beings of a combined beast and human form, divided into unorganized and organized forms; (*c*) anthropomorphic polytheism, where the super-human beings are conceived as manlike in form and in some measure as sharing man's ethical nature. Ethical religions, again, are subdivided into (*a*) communities in which the bond of the nation is a law under a divine sanction, such as Jainism, Brahmanism, primitive Buddhism, Taoism, Confucianism, Mazdaism, Mosaism, and Judaism; (*b*) communities which are religious and universalistic—as, for example, Mohammedanism, Buddhism, and Christianity.

Along with Tiele's classification, those of Tylor, Réville, and D'Alviella are deserving of study, because they are closely related to the facts and phenomena of the individual religions which are classified.

What has formed the starting-point in religious development has been variously represented. The question has been further complicated by the fact that it has been sometimes represented as though belief in a primitive monotheistic revelation were of the substance of the faith. Fetishism (Tylor, Comte), a belief in ghosts (Herbert, Spencer, Caspari, Le Bon), polytheism (Voltaire, David Hume), pantheism (Ulrici, Caird), honotheism (Max-Müller, von Hartmann, Schelling), monotheism (Creuzer, Prof. Rawlinson), have all been regarded as the original basis from which the later development arose. There is a sufficient and evident reason for this uncertainty. Primitive man has left no clear record of his belief or practice in these matters, but at best ambiguous emblems, which are interpreted by men who cannot rid themselves of their own preconceptions, and who are often governed in their interpretation by a prior idea of what religion must mean. All theories as to the origin and development of religion are purely hypotheses, based on insufficient and ambiguous data, and frequently implying a theory of human development which is latent in the theories. Yet such a theory, thus conditioned, may be helpful to thought and historical study. Religion can be taken in its simplest form as man's recognition of a world order or a system of things in which he himself was merged. He began by recognizing himself to be a part of this system, on an equal footing with all the other phenomena of his limited world. This was naturism, or a recognition and worship of natural phenomena. But man distinguished himself from the system of which he formed a part. He realized not merely his community of origin, but his difference of nature. What so distinguished him was his possession of a soul. Corresponding

with this stage of development is animism. The borders between animism and naturism must always have been fluctuating, since man may have often been unable to deny the existence of a soul like his own in many of the objects among which he was involved, and may have hesitated to deny it to any of these. But gradually he became conscious of how the soul, though involved in the body and influenced by it, was capable of controlling it and was not determined by it. He began to think and judge of other things in the light of this conception of himself, and to construe many phenomena of the world as evidence of an underlying soul. Hence arose spiritism, according to which spirit is the controlling factor and end of the world order.

Closely allied to animism, and springing from it, is the primitive form of polytheism, which endowed certain natural phenomena on the analogy of men with spirits, and which, acknowledging the power of these to control the phenomena through which they manifested themselves, strove to propitiate them in the interests of men. It is necessary, however, to distinguish between this primitive polytheism and a refined polytheism such as appears in Brahmanism, which makes the many gods little more than impersonations of the attributes of the one God. Primitive polytheism has not felt the need of unifying these many gods. The dualistic or monotheistic view of the world rose from polytheism through speculative thought, or through ethical judgment. As the philosophic mind strove after a final unity in thought, it made impossible to the religious feeling the worship of any save the one Source of all. And the ethical judgment made incredible the idea of anything save one law, the expression of one eternal Will. This, however, still left the possibility of Polytheism in its more refined form, as may be seen both in Hindu Brahmanism and in Gr. Neo-Platonism. Polytheism has only been finally transcended in the great monotheistic religions of Judaism, Islam, and Christianity.

RELIGIOUS BROTHERHOODS. See BROTHERHOODS, RELIGIOUS.

RELIGIOUS LIBERTY, or **LIBERTY OF CONSCIENCE,** the recognition of a State of the right of all to profess and practice any type of religion, or to do or abstain from doing whatever conscience or sense of right suggests. It is the antithesis of persecution, which has marked religious progress from its beginning. Religious liberty is now guarantee in all enlightened countries. In the United States it has always been recognized, but in European countries it is of comparatively recent origin. Under the Soviet rule in Russia religious liberty was to a large degree restrained and the adherents of the existing churches were persecuted. See RUSSIA.

REMAGEN (50° 35′ N., 7° E.), (ancient *Rigomagus*), town, Rhineland, Prussia; Rom. antiquities. Pop. 3,700.

REMAINDER, that portion or residue of interest which is made over to some other person, on the creation of a particular estate. It is always the work of certain parties; whereas Reversion—that portion of an estate left over, after a grant of less than the whole has been made by the owner to another person—arises by operation of law.

REMBAUG, a residency belonging to the Dutch, in the Is. of Java. Capital, Rembaug. Pop. 1,340,000.

REMBRANDT, R. HARMENSZ VAN RHYN (1606-69), greatest painter of Dutch school, was *b.* in Leiden. In 1624 he entered the studio of the famous Pieter Lastman at Amsterdam, but after six months' study Rembrandt left. Among his earliest pictures are *St. Paul in Prison,* the *Money Changer,* and the famous *Lesson in Anatomy.* In 1634 he *m.* Saskia van Uylenborch, who died eight years later.

From this time the artist's life was darkened with domestic trouble, and the gloom within is reflected in his art. It was character in the human face which appealed to R. above all else, and in which his intuitive realism found its noblest expression. This fact accounts for his preference for portrait-painting and the predominance of old age among his subjects. In his Biblical subjects his art is simple, frank, and bold; characteristic are the *Entombment* and *The Woman Taken in Adultery.* His finest portrait groups are the *Night Watch* and the *Lesson in Anatomy.*

His landscapes are also dark and sombre. The *Mill* is a magnificent specimen. As an etcher Rembrandt also reaches the highest perfection.

REMEDIOS, SAN JUAN DE LOS REMEDIOS (22° 30′ N., 79° 30′ W.), town, Santa Clara province, Cuba. Pop. 6,800.

REMENSNYDER, JUNIUS BENJAMIN (1843), American clergyman; *b.* Staunton, Va. He graduated at the Pennsylvania College, Gettysburg, in 1861, served in the Civil War in the 131st Pennsylvania Volunteers, 1862-63; graduated from the Gettysburg Theological Seminary in 1865 and was ordained to the Lutheran ministry in

the same year. He held pastorates in Philadelphia, 1865-74; Savannah, Ga., 1874-80, and since the latter date has been pastor of St. James Lutheran Church in New York City. In 1911 he was elected President of the Synod of the Evangelical Lutheran Church in the United States. His publications include *Heavenward*, 1874; *Doom Eternal*, 1880; *Six Days of Creation*, 1886; *The Atonement and Modern Thought*, 1905; *Mysticism*, 1908; *The Post-Apostolic Age and Current Religious Problems*, 1910; *What the World Owes Luther*, 1917, and *Light on the Shadows of Life*, 1919.

REMEY, GEORGE COLLIER (1841), American naval officer; *b.* Burlington, Iowa. He graduated from the United States Naval Academy in 1859, and served with distinction through Civil War. Later he was employed at many naval posts at home and abroad and was commandant of the naval base at Key West during the Spanish-American War. In 1898 he was made rear admiral. He was commander in chief of the Asiatic fleet, 1900-02, and chairman of the Lighthouse Board, 1902-03, retiring from the service in the latter year, though he was employed on special duty in 1905.

REMIGIUS, ST. (437-533); bp. of Reims, France.

REMINGTON, FREDERIC (1861-1909), American artist and author; *b.* Canton, N. Y. He studied at the Art Students' League, New York, and Yale Art School, but his special genius was only developed by the years he spent in the West as a cowboy and ranchman, where he gathered material for his pictures of frontier and Indian life that made him famous. His publications, embellished by his own illustrations, include *Crooked Trails*, 1898; *John Ermine of the Yellowstone*, 1902, and *The Way of an Indian*, 1906. Among his more striking artistic productions may be cited *The Last Lull in the Fight*, *The Advancer, or the Military Sacrifice*, *The Arrival of the Courier* and *A Buck Jumper*. Few have portrayed the horse with such spirit and fidelity to life. As a sculptor, his more notable works were *The Broncho Buster* and *The Wounded Bunkie*.

REMINGTON, PHILO (1816-89), American inventor and manufacturer. His name is associated with two great inventions, the Remington rifle and the Remington typewriter. The perfecting of the former occupied 25 years of his active life when he had charge of the mechanical department of his father's arms factory at Ilion, N. Y. On his withdrawal from business life in 1886, the control of the rifle plant and typewriter factory passed out of the Remington family into the hands of other organizations.

REMINGTON, WILLIAM PROCTER (1879), bishop; *b.* at Philadelphia, Pa. Graduated from the University of Pennsylvania in 1900. Taught in the De Lancey School and in 1900 was in charge of track athletics and member of the team at the Olympic games in London and Paris. Ordained a minister in 1906 of the Protestant Episcopal Church. From 1905-07 curate of the Holy Trinity Church at Philadelphia and vicar in 1907-11 of the Memorial Chapel of Holy Communion, Philadelphia. In 1911-18, rector of St. Paul's Church, Minneapolis, Minn., and in 1918 consecrated suffragan bishop of South Dakota. Was chaplain of Base Hospital, Number 26, organized by Mayo Clinic and University of Minnesota in 1917, and saw duty in the field. Was vice chairman of public recreation, Minneapolis Civic and Commerce Association.

REMINISCENCE.—(1) in general, a term for memory. (2) particularly, a translation of Plato's *Anamnesis*, or recollection in this life of knowledge gained in a previous state of existence.

REMIREMONT (48° N., 6° 36′ E.), town, of Moselle, department Vosges, France; has interesting remains of mediæval abbey; cotton spinning and weaving. Pop. 10,600.

REMITTENT FEVER, a form of malaria in which the paroxysms are not separated by an apyretic interval, but proceed from a degree of great intensity to one of less intensity, and again to one of great intensity. The disease is caused by the malaria parasite carried by the *anopheles* mosquito, and is characterized by the same general symptoms as other forms of malaria.

REMONSTRANTS, Dutch followers of Arminius who, in 1610, drew up Remonstrance against orthodox Calvinist views on predestination.

REMSCHEID (51° 12′ N., 7° 12′ E.); town, Rhineland, Prussia; hardware manufactures. Pop. 1920, 72,568.

REMSEN, IRA (1846), American chemist and educator; *b.* New York City. His studies at the College of the City of New York were followed by his graduation in 1867 from the medical department of Columbia University. He studied and taught chemistry abroad, was professor of chemistry and physics at Williams College, 1872-76, and in the

latter year became professor of chemistry in Johns Hopkins University. His bent toward original research was very pronounced, and he achieved national fame by his studies in oxidation and his successful purification of the water supply of Boston as well as by the invaluable service he rendered to the National Board of Health in connection with sanitation. He became president of Johns Hopkins in 1901, and held that position until 1912, following which date he was made president and professor emeritus. He founded the American Chemical Journal in 1879 and for some time served as its editor. His publications include *Introduction to the Study of Chemistry*, 1887; *The Elements of Chemistry*, 1888, and *A Laboratory Manual*, 1889. He was an officer in and member of many learned scientific societies.

REMUS, twin brother of Romulus.

RÉMUSAT, CHARLES FRANÇOIS MARIE, COMTE DE (1797-1875), Fr. statesman and writer; took an active part in politics from 1830; philosophic and hist. works of value for impartial attitude and width of view.

RENAISSANCE (Fr., 'rebirth') the intellectual development by which modern Europe was evolved from the Middle Ages. Mediæval and Renaissance culture differed in the conscious Humanism of the latter. Humanism struck at the roots of mediæval thought; instead of setting before man an ideal for the realization of which his individuality was to be sacrificed, it insisted on the further development of his actual character. The men of the Renaissance chose to be called Humanists from their salient characteristic.

'The first modern man was an Italian'; the Italians, with Lat. blood in their veins and living among the ruins of class. culture, readily revived the pagan spirit. Petrarch, 1304-74, although belonging to the Middle Ages, was one of first to feel the spell of antiquity; he treasured MSS. of Lat. classics and wrote to the Pope begging him to restore Rome to its place as the head of civilization. The humanistic movement began when the study of Gr. classics was added to that of Latin, and, if any approximate date can be assigned for the dawn of the new day, it was about the time of the visit of Emanuel Chrysoloras to Italy, who came from Byzantium in 1396 to lecture in Florence on Gr. literature. Scholars like the famous Poggio also visited Byzantium, learned Greek, and spread the knowledge in Italy; but the study was attended with difficulty till the fall of Constantinople, 1453, when Gr. scholars fled from Turk. rule to Italy.

Closely connected with this Revival of Learning is the movement which produced the Reformation. Study of the Gr. Scriptures and Gr. Fathers, known then as the *New Learning*, resulted in the break-up of the mediæval universal Church. The other movements concurrent with the Revival of Learning were chiefly the invention of printing, about 1450; the development of nationalities, which destroyed the mediæval conception of a world-empire; the use of gunpowder, which revolutionized the art of war and dealt a great blow at feudal organization of society; and the astronomical and geographical discoveries associated with Copernicus and the Port. and Genoese mariners who discovered America, rounded the Cape of Good Hope, and circumnavigated the globe.

The Ital. Renaissance produced great scholars and archæologists like Giovanni di Conversino, Coluccio de' Salutati, Gasparino da Barizza, Lorenzo Valla, Bembo, Paulus Jovius, Poggio, Biondo, Pico della Mirandola, and the Aldi, patronized by Humanists like the Medici; but the immortal works of the Ital. Renaissance are seen in Architecture, Sculpture, and Painting; famous names—Brunelleschi, Alberti, Michelangelo, Raphael, Donatello, etc. France and Germany were both influenced by the movement before England, where the Renaissance confined itself almost wholly to literature and scholarship; *cf.* famous Fr. Renaissance buildings, art, printing, etc., and great literary outburst of *Pleiade*. England had its small Oxford school of Humanists, of whom Erasmus was Dutch and with More alone enjoyed European fame. Architecture, etc., was little influenced till 17th cent. Surrey, Wyatt, and others experimented with new verse forms, but true Renaissance outburst in England only came with age of Shakespeare.

RENAISSANCE ARCHITECTURE. See ARCHITECTURE.

RENAIX (50° 45′ N., 3° 45′ E.), town, province E. Flanders, Belgium; dye-works; bleachfields. Pop. 22,000.

RENAN, ERNEST (1823-92), Fr philosopher. A Breton fisherman's grandson, he was (owing to his brilliant gifts) trained for priesthood at Saint Sulpice Seminary. Leaving through religious doubts, R. began to seek truth in Science. His first work, *The Future of Science*, 1849, was published last. He studied philosophy, theology, history of religions, and ancient languages, but

never became a great scholar; although he did much service to Biblical criticism, his style is his great merit; his opinions have roused much disputation; *Life of Jesus*, 1863, and *Origins of Christianity* caused great sensation by rejection of divine elements from history of Christianity; best work, partly autobiographical *Souvenirs d'Enfance et de Jeunesse*, 1876-82, written in exquisitely simple style; last work, *People of Israel*, 1887-92.

RENARD, ALPHONSE FRANÇOIS (1842-1903), Belg. geologist; prof. of Geol., Univ. of Ghent, 1888; awarded Bigsby medal (Geological Soc., London), 1885.

RENAUD DE MONTAUBAN, hero of Fr. and Ital. romance. Aymon, a favorite of Charlemagne, has four sons—Renaud, Alard, Guichard, and Richard. A feud arises between Charlemagne and the youths. Renaud in his exile becomes a hero of Christian chivalry.

RENAUDOT, THEOPHRASTE (1586-1653), Fr. physician and philanthropist; *b.* at Loudun; summoned to Paris by Richelieu; opened a charitable information bureau, and a free dispensary; in 1631 established the first Fr. newspaper, the weekly *Gazette*; app. Historiographer Royal by Mazarin.

RENDALL, JOHN BALLARD (1847), university president; *b.* at Madura, Southern India. In 1870 graduated from Princeton College. 1876, ordained a Presbyterian minister. Professor of Latin since 1870 and president since 1906 of Lincoln University. From 1899-1900, a member of the Pennsylvania House of Representatives. In 1912 a delegate to the Progressive National Convention at Chicago. Was trustee of Wilson College, Chambersburg, Pa. In 1908, moderator of Synod of Pennsylvania. 1914-15, president of the Minister's Social Union, Philadelphia and Vicinity. In 1917, member of the Draft Exemption Board for Chester County.

RENDSBURG (54° 18′ N., 9° 40′ E.), town (former fortress), Schleswig-Holstein, Prussia, on Eider and Kaiser Wilhelm Canal; cotton goods. Pop. 17,000.

RENÉ, GOOD KING RENÉ (1409-80), Duke of Anjou, of Lorraine, and Bar, count of Provence, etc., king of Naples and Jerusalem; *m.* Isabel, heiress of Charles II. of Lorraine, on whose death he sought to enter duchy of Lorraine, but was defeated and imprisoned, 1431; released, 1432, but revived claim, 1435, and returned to prison; succ. *bro.*, Louis III., in Naples, Provence, and Anjou, 1435; liberated, 1437, but could not wrest Naples from Alphonse of Aragon, and established himself in Provence, where he made a great name in the history of lit.

RENFREW (55° 53′ N., 4° 24′ W.), town, on Clyde, Renfrewshire, Scotland; shipbuilding yards, engineering-works. Pop. 1921, 14,129.

RENFREWSHIRE (55° 50′ N., 4° 30′ W.), county, W. Scotland, lying along Clyde; area, 239 sq. miles; surface reaches an extreme height of 1,711 ft. in Hill of Stake; chief towns, Renfrew (county town), Paisley, Greenock, Gourock, Port-Glasgow; agriculture, dairy-farming, and stock-raising are important industries; produces coal, iron-stone, and shale; manufactures thread, cottons, chemicals; has shipbuilding, engineering, sugar-refining, and print and bleach works. Pop. 1921, 298,887.

RENNENKAMPF, GENERAL (*d.* 1918), Russian soldier of Ger. extraction; served with distinction in Manchurian and Russo-Jap. campaigns, and was, shortly prior to World War, appointed to command of E. Prussian frontier forces in Vilna military dist.; took offensive against Germans against advice of immediate superior, and driving back forces opposed to him, occupied in succession Gumbinnen and Insterburg, Aug. 21, 1914, from which he pressed on towards Königsberg. These successes produced Ger. reinforcements, which in last week of Aug. defeated Samsonov at Tannenberg, a battle in which Rennenkampf, who could have annihilated Germans by moving down on their flank, took no part, owing to faulty information. He commanded army before Warsaw, Oct., 1914, during first Ger. attempt on that city, but his delay in sending reinforcements to Ruzsky during fighting around Lodz, Nov., 1914, robbed that general of a signal success, and brought about Rennenkampf's supersession. He was placed upon retired list, 1915, was arrested, March, 1917, and put to death by Bolsheviks about a year later. His Ger. descent led to general mistrust after his change of fortunes.

RENNES (Gallic *Condate*) (48° 6′ N., 1° 40′ W.), town, at junction Ille and Vilaine; capital, department Ille-et-Vilaine, France; ancient capital of Brittany; abp.'s see; principal buildings are the cathedral, church of Notre Dame, Mordelaise gate, palace of justice, and town hall; has univ. coll., picture-gallery, and library; tanneries,

sawmills; besieged by the English in 1356. Pop. 1921, 82,241.

RENNET, a preparation obtained from the fourth or rennet stomach of the calf, having the power of coagulating or clotting milk so that the fat is entangled in the curd. A standard of strength is that one part of R. should coagulate 10,000-parts of sweet milk in forty minutes at a temperature of 95° F. It is prepared and obtainable in solution and as tabloids and powder.

RENNIE, JOHN (1761-1821), Scot. engineer; began life as millwright; constructed or designed Waterloo Bridge, London Bridge, London Docks, Plymouth Breakwater, and other great engineering undertakings.

RENO, a city of Nevada, in Washoe co., of which it is the county seat. It is on the Southern Pacific, the Virginia and Truckee and the Nevada, California and Oregon railroad, and on the Truckee river and the Truckee Carson canal, a government irrigation project which is over 30 miles in length. Reno is the chief city of the State in industrial importance and has railroad shops, reduction works, flour mills and meat packing establishments. It is the seat of the State University and of the United States Agricultural Experiment Station. There is also a State Hospital for Mental Diseases, Mackay School of Mines, a public library, Y. M. C. A. building, and other public buildings. Pop. 1920, 12,016.

RENOUVIER, CHARLES BERNARD (1815-1903), Fr. philosopher; disciple of Kant; held that metaphysics cannot reach knowledge of God.

RENOVO, a borough of Pennsylvania. Pop. 1920, 5,877.

RENSSELAER, a city of New York, in Rensselaer co. It is on the New York Central and the Boston and Albany railroads, and on the Hudson river, directly opposite Albany. It is an important industrial city and has manufactures of ice, tools, chains, dyes, medicine, clothing, lumber products, etc. It has also the shops and freight yards of the Boston and Albany Railroad. There is a public library, other public buildings and several parks. Pop. 1920, 10,823.

RENSSELAER POLYTECHNIC INSTITUTE, educational institution founded at Troy, N. Y., in 1824. It was the first school of practical science established in this or any other country. Following 1850 the institute became primarily devoted to civil engineering. Its curriculum includes two courses of four years each in civil engineering and practical science. It has a long and distinguished list of graduates, and its reputation is international. It has an endowment of $2,658,100. In 1923 it had an enrollment of 1,133 students and there were 83 members of the faculty.

RENT, the charge made by the landlord for the use of land or premises thereon. Different kinds of rent exist—*Rack rent,* an excessive charge equal to the full annual value of the property; *peppercorn rent,* a nominal charge, often inserted in building leases, to be paid while premises are in course of erection; *ground rent,* paid to the owner of the freehold; *net rent,* the amount payable to the landlord clear of all deduction; *quit rent,* the ancient rent of a freeholder to the manor whereby he went quit and free of all services. Defined by Ricardo as 'that portion of the produce of the earth which is paid to the landlord for the use of the original and indestructible powers of the soil;' by Marshall as 'the income derived from the ownership of land and other free gifts of nature.'

RENWICK, JAMES (1662-88), a famous Scottish preacher and martyr of the Covenant. He was educated at the University of Edinburgh, but as he would not take the oath of allegiance he was denied public laureation at the close of his academic career. In 1682 he was admitted into the University of Groningen, Holland, and after various obstacles had been overcome, the classis of Groningen ordained him, and he set sail for Dublin. In 1683 he crossed over to Scotland and preached at Darmead, lifting the standard where it had fallen on the death of Cameron and Cargill. The privy council of Edinburgh denounced him as a traitor, and so he wandered about preaching, and publishing manifestoes for some five years, concealing himself in caves. Through not having acknowledged James II. 1685, R. again had to conceal himself, but at last was caught in Edinburgh and executed.

REORGANIZED CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS, a religious denomination organized at Amboy, Ill., in 1860, under the presidency of Frederick M. Smith, son of the Mormon 'Prophet' Joseph Smith. The church is an off-shoot of the original Mormon organization. Under the leadership of Zenas H. Gurley and Jason W. Briggs, former prominent leaders in the Mormon Church, the new organization seceded from the parent church on the ground that the latter had lost its divine sanction because of its failure to complete within a given time the Mormon Temple at Nauvoo, Ill. The

tenets of the reorganized church are similar in many respects to those of the old organization, with the exception of the belief in polygamy, of which the new church is a determined opponent. Its official publication is the Saints Herald, and the headquarters of the denomination, which from 1863 to 1881 were at Plano, Ill., are now at Lamoni, Iowa. The church carries on missionary work in many countries. The membership is about 90,000, of whom about 14,000 are in foreign lands.

REPARATIONS, a term applied to the penalties imposed on Germany and her allies as the defeated belligerents in the World War of 1914–18. Its origin is traceable to the declaration made in 1916 by the then British Premier, H. H. Asquith, in the House of Commons, that Germany, for her inhuman outrages in her conduct of the war, 'would pay to the uttermost farthing.' The victorious Allies in the Peace Treaty of Versailles created an interallied body known as the Reparations Commission, composed of delegates (mostly the premiers or foreign ministers) of the leading Allied powers, who determined the reparations to be made by Germany after considering her counter proposals, and periodically estimated her capacity to pay her obligations. In January, 1921, the Allies fixed the amount of reparations at the sum of 226,000,000,000 gold marks. At the Cannes conference of the Allied premiers held twelve months later, the sum was reduced to 132,000,000,000 gold marks. In January, 1923, at a conference in Paris, the Allied premiers cut further the amount Germany must pay and left it tentatively at 50,000,000,000 gold marks. The 1921 proposal was made when the Allied governments were still under the influence of the Asquith slogan which had been stressed by Lloyd George. It was duly recognized as an impossible demand. The 1922 proposal was submitted as an irreducible minimum, but that, too, had to be discarded as excessive, or, at any rate, 132,000,000,000 gold marks was more than Germany could be made to pay.

Towards the end of the year 1922 Germany declared herself insolvent and failed to meet her coal deliveries to France, causing the latter to occupy the Ruhr. She proposed that reparations be fixed at a sum she could pay, that she should have a moratorium for three or four years in order to be relieved of any payments whatever, in cash or in kind, and that she raise a loan from other countries of 500,000,000 gold marks. If these proposals were accepted she would in return abolish superfluous departments, reduce the number of government employees, avoid unproductive expenditure, organize profitable state industrial enterprises, stimulate labor productivity, balance her budget and stop printing worthless paper money. The admission of extravagance and needless losses in thus offering to reform her administrative policy was obvious but her proposals were rejected.

The Allied premiers met in Paris in January, 1923, when Great Britain proposed a plan by which Germany, under the best estimate possible of her assets, real and potential, could pay 42,000,000,000 gold marks in full and final settlement. France construed the British plan as showing that it would yield from Germany at best no more than 27,000,000,000 gold marks. France and Great Britain drifted apart over the issue, especially over the penalty to be imposed on Germany for defaulting in her fuel deliveries, and the Ruhr invasion followed. Germany then offered to pay a minimum of 30,000,000,000 gold marks or $7,500,000,000, the maximum to be whatever a proposed international board of arbitrators may fix as equitable, and she also proposed the raising of $5,000,000,000 by a foreign loan. These proposals, like those previously made by her, were viewed as mere trial balloons and not considered seriously. Germany had not a shred of credit upon which to float an international loan. The situation in the middle of 1923 was that Germany planned a grandiose new reparations program under which it was estimated she could raise more than a billion gold marks annually for ten years by a mortgage on the entire real estate of the nation and a reorganization of the federal railways, posts and telegraphs under the operation of the German League of Industrialists.

According to the Reparations Committee, Germany up to the end of 1922 had paid reparations as under in gold marks (about four marks to the dollar):

Payments in 1921, composed of cash, $1,184,172; deliveries in kind, $2,799,342,000; and state properties in ceded territories, $2,504,342,000; less loans from the Allies to Germany amounting to $390,000,000.....	$ 6,097,856,000
Payments in 1922, composed of cash payments, $721,493,395; and deliveries, $684,000,000.....	1,405,493,395
	$ 7,503,349,395

To which must be added:	
Restitutions (Property found in Germany belonging to French or Belgian nationals)	2,700,000,000
Allied expenses in Germany (army costs)	1,206,650,005
Sequestrated property	4,000,000,000
(Total (in gold marks)	$15,409,999,400
Total (in dollars, approximately)	3,850,000,000

Of this sum only about $1,200,000,000 was paid in cash or deliveries in kind. The remainder included restitutions, which were not properly considered as reparations, as they consisted of property taken by the German armies and afterwards restored, and also sequestrated property abroad, including the German holdings in the United States, most of which would eventually be returned. Also excluded were the valuation of the Sarre coal (held by the French) and of the lost German colonies. The figures were interpreted as expressing indefinite valuations by which they could be twisted into a good case either for Germany or the Allies.

The claim of the United States against Germany, amounting to $255,000,000, for the upkeep of the American army of occupation stationed at Coblenz from November, 1918, to January, 1923, amounting to $255,000,000, was settled with the Allies in May, 1923. It had been a subject of dispute and misunderstanding. The United States received priority as a creditor to the extent of 25 per cent. of Germany's cash payments each year. German failure to pay reparations led in Jan., 1923, to French occupation of the Ruhr (*q.v.*). In Nov., 1923, a commission of experts was appointed to determine Germany's ability to pay, and methods for payment.

REPINGTON, CHARLES A'COURT (1858), Brit. soldier and military critic. As military correspondent of the Times wrote series of brilliant articles on Russo-Japanese War; during World War dispatched telegram from France after battle of Festubert (May, 1915), stating that 'the lack of a sufficient supply of heavy ammunition was a fatal bar to our success;' resigned owing to disagreement with his paper's policy, Jan., 1918; he became correspondent of the Morning Post.

REPLEVIN. A R. is where a person distrained upon has the distress returned into his own possession, upon giving security to try the right of taking it in an action, on condition that if the action goes against him he will return the cattle or goods once more into the hands of the distrainor.

REPLICA, a copy of a picture or other work of art made by the artist who executed the original.

REPNIN, PRINCE ANIKITA IVANOVICH (1668-1726), Russ. general under Peter the Great; made field-marshal by Catherine I. Grandson, Prince, established the first Fr. newspaper, the weekly *Gazette*; app. Historiographer Royal by Mazarin.

REPORTING. See JOURNALISM; NEWSPAPERS.

REPOUSSÉ (Fr. beaten back), a term generally employed in connection with metal work, by which a pattern or design is hammered from the inner side of the object to be decorated, the design being perfected on the outside by means of chasing tools.

REPPLIER, AGNES (1858), American author of French descent; *b.* Philadelphia, Pa. She was educated at the Sacred Heart Convent in Torresdale, Pa., entered on literary work and devoted herself especially to the writing of essays in which she has achieved a reputation not equaled by any other woman in America. Much of her time in late years has been spent in Europe. Her publications include *Points of View*, 1891; *Essays in Miniature*, 1892; *Essays in Idleness*, 1893; *The Fireside Sphinx*, 1901; *Compromises*, 1904; *A Happy Half Century*, 1908; *Americans and Others*, 1912; *Counter Currents*, 1915, and *Points of Fiction*, 1920. She is also compiler of *A Book of Famous Verse*.

REPRESENTATIVE GOVERNMENT. See GOVERNMENT.

REPRIEVE. A R. is the withdrawing of a sentence for an interval of time whereby the execution of a criminal is suspended, and may be granted either (*a*) by the Federal or State executives, or (*b*) by the court, either before or after verdict. The grant of a R. is an entirely discretionary matter, but in two cases the court has no option, and must grant a R., (*viz.*) when a woman sentenced to death is pregnant.

REPRODUCTION AND REPRODUCTIVE SYSTEM. Reproduction is one of the prime functions of protoplasm, and is intimately related to growth of, which it may indeed be regarded as a special case. The phenomenon occurs in its simplest form in many Protozoa, as in amœba, which grows until it reaches the

limit of advantageous size, and then reproduces by dividing into two parts (fission). The reason for this process is that each particle of protoplasm feeds, breathes, excretes, and so on through the surface. But in any spherical body the volume increases faster than the surface, and therefore, once a certain limit, definitely fixed for the species, is passed, the chemical interchanges between the internal particles of protoplasm and the surrounding medium are checked, and division follows. But in many Protozoa—(*e.g.*) in Paramœcium—both growth and reproduction become impossible unless there is periodically a process of conjugation, or union of two separate masses of living matter. Comparing multicellular forms with the Protozoa, we find that, generally speaking, these, in place of simply dividing, give off two kinds of specially modified cells, known respectively as ova and spermatozoa, which after sexual union has occurred become capable of developing into new organisms. This is the ordinary process of sexual reproduction, as known alike in the higher plants and the higher animals.

Again, in certain of the multicellular animals, and in most of the multicellular plants, another type of reproduction consists in the liberation of clusters of the ordinary body cells, which are capable of growing into a new organism. In animals this type of reproduction is frequently associated with the formation colonies, the buds remaining in connection with the parental stock, as in sea-firs, colonial tunicates, and so on. In plants vegetative reproduction, as it is usually called, is very frequent—*cf.* the tubers of the potato, the subsidiary bulbs produced by most bulbous plants, the runners of the strawberry, and so forth. The frequency of this type of reproduction in plants as compared with animals is due to the much greater histological simplicity of plants. In animals it is limited to organisms of relatively simple structure, where a liberated bud may contain samples, as it were, of all the cells of the body. The vegetatively produced plant comes very much sooner to maturity, for it starts with more capital than the average seed; and the vegetatively produced offspring resembles the parent exactly. On the other hand, plants arising from seeds, which are the result of the union of two separate cells, may or may not resemble their parents closely; in other words, they display one form of the phenomenon of variation.

Apart from budding, a peculiar mode of a sexual reproduction exists in plants known as spore formation, the vast majority of plants being capable of liberating single cells which develop into a new organism without any previous process of fertilization—that is, of sexual union. As one ascends the plant scale, however, the organism produced by the germinating spore progressively diminishes in complexity, until in the flowering plants it has almost disappeared, and is quite incapable of independent existence.

Sexual reproduction by the union of male and female cells is practically universal in multicellular plants and animals. In some cases, however, female cells are produced which without sexual union are capable of development. Such ova are described as parthenogenetic, and occur, for example, in some insects. In the general case, however, eggs must be fertilized before they can develop, the process consisting in a union of the egg nucleus with the nucleus of the male cell. Before this can be effected there must be some means of bringing the two cells into contact. It was proved first in the case of ferns, and subsequently in organisms in general, that the female cell exercises a strong attraction on the male cell—an attraction which is due to certain waste products produced by the female cell. This power of being influenced by chemical stimuli is known as chemotaxis, and is a prime property of organisms. In the majority of cases the male cell is a freely moving spermatozoon; and when it is brought within a certain distance of the ovum, the chemotactic action of the latter causes it to swim up to it. In many marine animals it is on chemotaxis alone that fertilization depends. For example, in the common sea-urchin ova and sperms are shed freely into the water, and it is a matter of 'chance' whether the sperms do or do not come sufficiently near the ova for the chemotactic action to assert itself. But this is an obviously wasteful method, for where the chances of fertilization are small, enormous amounts of ova and sperms must be produced. We therefore find, alike in plants and in animals, that means exist whereby the contact of male and female cells is ensured, with a corresponding economy of production. In the higher plants the agency of wind, insects, and so forth is taken advantage of, while in the more specialized animals a process of pairing occurs by which the same result is attained. The elaborate adaptations to ensure pollination in the higher plants, and the no less elaborate development of means of sexual attraction in the higher animals, all serve to emphasize the supreme importance of sexual reproduction to the species. In its mingling of two different germ-plasms we have the proximate cause of variation,

and therefore of the process of evolution.

All methods of reproduction are costly to the individual, wherefore reproduction does not normally occur until growth has almost ceased—that is, until the individual has reached its maximum development. Speaking broadly also, it may be said that hypernutrition increases the power of reproduction, as witness the enormous productivity of parasites. It is also a commonplace of biology that the rate of reproduction is highest in unspecialized organisms, and tends to diminish with progressive specialization. This statement, however, requires some qualification. The actual number of eggs or young produced certainly tends to be less in highly specialized organisms, but the survival rate is not less. The bony fish lays an enormous number of small eggs, which are fertilized externally and have no protective investment. The dogfish and its allies (elasmobranchs) lay relatively few eggs, which are fertilized internally, are protected in a case, and contain a large amount of yolk; but then the survival rate in the latter case is infinitely greater than in the first. At the same time, there is some evidence that decadent or dying stocks manifest a loss of reproductive power. This would seem to be the case with the New Zealand lizard (Sphenodon), which is dying out; perhaps also with the elephant. In the human species, in certain races especially, there is in progress a marked decrease in the birth-rate which is not associated with a very notable rise in the survival rate; but the biological explanation of this phenomenon is meantime difficult to obtain. The reason in the general case for the progressive diminution in higher forms in the number of offspring produced is not, however, far to seek. It is better for the species that relatively few should be produced with increased chance of surviving to maturity, than an enormous number where the chances of an individual surviving are small, because the agents of elimination which act in the earlier stages are largely non-selective in their mode of action. Take, for example, a swarm of young bony fishes. The eliminating agents in this case are organisms which snap up individuals from the swarm without regard to the minor variations existing among them. If it is possible to protect the young through their early stages, as is done by the parents in more specialized forms, until the agents of elimination act selectively—(*i.e*) in picking out the slower, less vigorous, or less intelligent forms—then by leaving the more fit to breed, the standard of the species is always being raised; hence the biological justification of the parental care shown by birds and mammals.

REPTILES constitute a class of the phylum Vertebrata. In spite of the obvious external differences, they are most nearly related to birds, whence the use of the term Sauropsida to include the two classes. If fossil forms be taken into account, however, reptiles occupy a central position in the vertebrate phylum; for they have themselves been derived from an amphibian stock, and have apparently given rise alike to birds and to mammals. For practical purposes reptiles are vertebrates with a scaly skin, which breathe by lungs and never by gills, which have one occipital condyle, and, owing to the admixture of arterial and venous blood in the aorta, are cold-blooded instead of warm-blooded.

Reptiles are predominantly terrestrial creatures, but they exhibit much diversity of habit. The majority crawl on the surface, but some snakes and lizards burrow underground, many Chelonia and a few snakes have adopted an aquatic life, snakes and lizards frequently adopt an aboreal habit, flying lizards parachute from tree to tree, and the extinct pterodactyls conquered the air. All are dwellers in tropical or temperate regions, but the former is their true home and their numbers dwindle as one recedes from the equator. Like many creatures subjected to extremes of heat, a large proportion of their number pass over the dangerous drought seasons in a state of torpor, known as *aestivation*, a phenomenon very similar to the physiological winter sleep or *hibernation* in which others of their class (tortoises are well-known examples) spend the cold periods of the year.

At the present day reptiles, though they number almost 5,000 species, are decadent members of the animal kingdom, for in earlier ages no creatures could compare with them in size, strength, or number. Their earliest fossilized remains have been found in rocks of Permian Age, but in Jurassic and Cretaceous times they reached their greatest development, constituting the predominant inhabitants of air, land, and water. A few of the strange forms then in existence are mentioned below in the note on classification.

Reptiles, though of little use to man, still have much significance for him, for in India alone an annual toll of some 20,000 lives is paid to the bite of poisonous snakes, and crocodiles add to the death-roll. African crocodiles harbor in their bodies a trypanosome which subsequently develops in the tsetse fly, and has been considered to be the cause

of the fatal disease sleeping sickness. But this allegation seems to be due to a confusion between some stages of the crocodile parasite, *T. grayi*, and the distinct *T. gambiense*—the true cause of sleeping sickness. Reptiles serve a useful purpose from the human point of view in destroying the multitudes of insects upon which most lizards and many snakes feed, and the latter especially do much to keep down the numbers of ground vermin. Apart from such indirect services, crocodiles furnish a stout ornamental leather, manufactured from portions of their skin, and the horny carapace of tortoises is made into articles of tortoise-shell.

The class Reptilia is divided into eleven orders, sometimes grouped in various sub-classes:

Order I. *Rhynchocephalia*—(*e.g.*) *Sphenodon*, sometimes made the solitary occupant of the sub-class *Prosauria*.

Order II. *Lacertilia* or *Lizards*.

Order III. *Ophidia* or *Snakes*. (Owing to their many resemblances, lizards and snakes are sometimes grouped together in the sub-class *Sauria*.)

Order IV. *Chelonia*, *Tortoises* and *Turtles*.

Order V. *Crocodilia*, *Crocodiles*.

Extinct forms:

Order VI. *Phythonomorpha* (*e.g.*, *Liodon* and *Dolichosaurus*), elongated Cretaceous relatives of *Sphenodon* and the lizards, found in Amer. and European deposits; body snake-like, sometimes 80 ft. long, with two pairs of swimming paddles; marine and carnivorous.

Order VII. *Ichthyosauria* or *Ichthyopterygia* (*e.g.*, *Ichthyosaurus*), extinct reptiles which lived in the Old World from Triassic to Cretaceous times; body whale-like, 30 to 40 ft. long, with two pairs of swimming paddles; marine and carnivorous.

Order VIII. *Plesiosauria* or *Sauropterygia*, inhabitants of Europe, New Zealand, and America in the Chalk period; heavy-bodied and long-necked, related to tortoises and turtles, but without external armor. Some lived on land, but the majority were marine and had paddle-like limbs and tail—(*e.g.*) *Plesiosaurus*, 40 ft. long, found fossil in England, and the Amer. *Elasmosaurus*.

Order IX. *Theromorpha* (*e.g.*, *Dicynodon* and *Elginia*), Permian and Triassic reptiles whose remains are found mainly in S. Africa, though *Elginia* and others are Scot. fossils, and several are Amer. lizard-like land creatures, interesting because they exhibit both reptilian and mammalian characteristics, indicating perhaps the point of origin of the mammals.

Order X. *Dinosauria*, *Dinosaurs*, mammal-like, with large body bearing four limbs, on all of which, or on the hinder pair only, the creatures moved. Their remains, which show bird and mammal relationships, are widely distributed in deposits ranging from Triassic to Cretaceous Age, especially in America and Belgium. All were terrestrial, but some, such as the gigantic *Diplodocus*, *Brontosaurus* (50 ft.), and *Iguanodon* (28 ft.), were herbivorous and probably amphibian, while *Laelaps* and *Megalosaurus* were fiercely carnivorous; examples of the former stood 18 ft. high.

Order XI. *Pterosauria*, *Ornithosauria*, or *Pterodactyls* (*e.g.*, *Pterosaurus* and *Rhamphorhynchus*), highly specialized flying reptiles, the remains of which are found in rocks from Lower Jurassic to Upper Chalk; wing-like flaps of skin extended from an exceedingly long finger to hind limbs and tail, Though distinctly reptilian, in many structures they closely resemble birds, varying 'from the size of a sparrow to that of a condor,' but no traces of such external covering as feathers have been found.

REPUBLIC (Lat. *res*, 'business;' *publicus*, 'public'), state in which government is aristocratic or democratic, not monarchical. The city-states of antiquity usually passed through a monarchical to a republican phase, and attained their highest culture in the latter, but the republics of Greece and Rome were oligarchic—a few ruling a large slave class. The anc. cities of Italy retained the Roman ideal. Rome itself made attempts at republican revolution in 12th and 14th centuries, while Venice quickly won freedom from imperial control. Florence became the center of republican feeling under Renaissance influence; the political institutions of Greece and Rome were studied, but the Florentine republic came to an end, 1530, and the greater part of Italy, like the rest of the world, came under absolute government. Calvanism was the parent of modern democracy—the Swiss federation, the Dutch republic, the Eng. Commonwealth, and Amer. colonies (of which republicanism was natural development); and Fr. Revolution, it is agreed, was largely due to admiration of the *philosophes* for Eng. and Amer. ideas. The Fr. Republic, however, was the child of both Reformation and Renaissance, owing as much to Plutarch as to democratic ideals of reformed countries. U. S. A. and Switzerland are *federal* republics—(*i.e.*) composed of federated states; France and Portugal are unitary republics. As a result of upheaval produced by World War, Germany, Austria, and Russia became

republics, and some other states which secured autonomy also adopted that form of government. For methods of government in republics, see FRANCE, UNITED STATES, etc.

REPUBLICAN PARTY. The present Republican party emerged as a national power in 1860, when it first carried the country against the Democrats and elected Lincoln as President. It was then only six years old, having been founded in Jackson, Mich., in 1854 by a group of Northern Whigs, Democrats and Free Soldiers who objected to the passage of the Kansas-Nebraska bill. The party spread rapidly, especially in the West, and absorbed Sumner and Chase among the Free Soilers, Seward, Fessenden, Greeley, Lincoln, and Thaddeus Stevens among the Northern Whigs, and William Cullen Bryant and Gideon Welles among the Northern Democrats. In the year of its birth it carried 15 out of 31 states, elected 117 Republican Congressmen and 11 Republican Senators. In 1856 its first national convention nominated John C. Fremont for the presidency. He was defeated, but the party elected most of its Congressional candidates in the North.

The party committed itself to oppose the extension of slavery and to assert national supremacy as against the advocacy of States' Rights by the Democrats. It challenged the Dred Scott decision of the Supreme Court in 1857, thereby alienating the South, and with Lincoln's election in 1860 voiced Northern sentiment in the Civil War that followed. In 1864 its platform declared for the complete extirpation of slavery. The party's supremacy in governing the country remained unchallenged till 1874, when a Democratic House was elected. It finally lost the presidency in 1884 with the election of Grover Cleveland, the first Democratic president since Buchanan, Lincoln's predecessor. Before and since it strongly espoused a high tariff, and upon the reaction of the country to its protectionist policy its varying fortunes have generally depended.

The existing party had two forerunners. One was the present Democratic party, which, in its early days shortly after the ratification of the Constitution opposed the Federalists and was known as the Republican party. The other had a brief life between 1825 and 1836. This second Republican party was the creation of the supporters of John Quincy Adams, and became absorbed by the Whigs. See DEMOCRATIC PARTY and UNITED STATES HISTORY.

REPUBLICAN RIVER, THE, formed by two branches rising in E. Colorado, and flowing E. and S. E. to Junction City, Kans., where they unite with other streams to form the Kansas R. Length, 520 m.

REPUDIATION, or RENUNCIATION: (1) In the law of contract a party who repudiates the contract before the time for performing it has come, thereby commits a breach which entitles the other not only to consider himself discharged from doing anything under the contract but *at once* to sue for damages or specific performance. (2) In the civil or Roman law of marriage, R. means either a declaration by one of two spouses of his or her intention of rescinding the marriage, or an actual termination of cohabitation by one spouse with the like intention.

REPULSION, in physics, a term applied to the action of two bodies exerting upon one another when they tend to increase their mutual resistance.

REQUEÑA (39° 31′ N., 1° 10′ W.), town, Valencia, Spain; manufactures wine. Pop. 17,000.

REQUEST, LETTERS OF, are sent by an inferior judge to the Dean of Arches, for the trial of cases, when the right of jurisdiction has been waived in the lower court.

REQUIEM (Lat. *requiem* (acc.), rest), a celebration of the Holy Eucharist for a person or persons departed. The name is derived from the first words of the introit, *Requiem aeternam dona eis, Domine.*

REREDOS, in churches, the ornamented wall or screen at the back of the high altar. It usually consists of a screen detached from the wall, and is elaborately adorned with sculpture and tracery.

RESCHEN SCHEIDECK (46° 50′ N., 10° 31′ E.), Alpine pass (4,890 ft.) between Inn and Adige valleys.

RESEARCH COUNCIL, organization created in 1916 at the request of President Wilson under the charter of the National Academy of Sciences. The function of the organization is to develop the pure science on which applied science rests. The scope of the work of the Council is illustrated by the series of major divisions of which it is composed. One group of seven is devoted to the study of mathematics, chemistry, physics, psychology and anthropology, geology, biology, medicine, agriculture and engineering. Another group concerns itself with relations, such as state relations, federal relations, foreign relations, educational relations, research ex-

tension and research information. The organization aims to keep in touch with the various government departments. Its membership is constituted of prominent business and scientific leaders. The headquarters of the Council are at the Smithsonian Institution, Washington D. C.

RESERVATIONS, INDIAN. See INDIAN RESERVATIONS.

RESERVE, NATIONAL GUARD. See ARMY, UNITED STATES.

RESERVOIR, a construction for the storage of water. The present article deals with constructions so large that it would be impracticable to cover them with roofing. Where the source of water supply is the rainfall from a certain catchment area, a reservoir has to be formed of such capacity that sufficient water will be stored to keep the supply up to its required quantity during any drought that is likely to occur. In calculating, it is usual to allow for three consecutive dry years, in which the rainfall only amounts to four-fifths the aver. annual rainfall. With regard to the source of supply, attention must be paid to (*a*) the meteorology of the district—the average and minimum ann. rainfall, how it is distributed throughout the year; and (*b*) the geology and the configuration of the catchment area—whether the rain runs off rapidly or whether much of it sinks down, where the impermeable strata lie, and where faults and dykes occur.

RESHID, PASHA (1800-58), a Turkish statesman *b.* in Constantinople. He represented Turkey in several diplomatic posts and was chief of the Party of Progress.

RESHT (37° 15′ N., 49° 25′ E.), town, Gilan, Persia; trade in silk and cocoons. Pop. 40,000.

RESINA, a town in the prov. and 4½ m. S.E. of the city of Naples, Italy, on the W. slope of Vesuvius and on the Bay of Naples; is famous for its Lacrimæ Christi wine. The electric railway up Mt. Vesuvius starts from here. Pop. 20,000.

RESINS, vegetable compounds of oxygen, carbon and hydrogen; soluble in alcohol, ether, essential oils, alkalis. Hard r's are solid; they include lac, copal, guaiacum, mastic, jalap. Soft r's contain essential oils.

RESORCINOL or **RESORCIN,** $C_6H_4(OH)_2$. An organic compound belonging to the group of dihydric phenols. It crystallizes as colorless needles, melting at 119° C. readily soluble in water. The substance boils at 276 C. and is slowly volatile in steam. It is prepared by fusing caustic soda with sodium-benzene-disulphonate. It has considerable commercial importance owing to the fact that it is widely used in the preparation of dyes. On fusing with phthalic anhydride it is converted into fluorescein. Its aqueous solution gives a dark violet color with ferric chloride.

RESOURCES, NATURAL, PROTECTION OF. See CONSERVATION.

RESPIRATORY SYSTEM includes the nasal passages, pharynx, larynx, trachea, bronchi, and lungs; the first three are treated under Olfactory System, Pharynx, Larynx, so that the trachea, bronchi, and lungs only fall to be considered here.

The *trachea* is the tube which conveys the air from the larynx to the bronchi, being rather over 4 in. in length, the upper inch being situated in the neck, and the remaining part in the thorax. It is composed of a fibro-elastic membrane, in which are horseshoe-shaped plates of cartilage which serve to keep the passage permanently open; the posterior aspect, where the cartilages are deficient, being closed by non-striped muscle, which, by contracting, can alter the diameter of the tube.

The *bronchi*, into which the trachea divides, are two in number, the right being rather wider, shorter, and at a less acute angle than the left. The structure of the bronchi resembles that of the trachea, rings of cartilage, deficient behind, similarly keeping the tubes permanently open. The bronchi branch freely on all sides in the substance of the lungs, the smaller branches sending off still smaller branches, and as the air passages become minute the cartilages disappear, and the muscle fibres form a layer all round the passages.

The *lungs* are two in number, and are conical, spongy, vascular organs, situated one on each side of the thorax. Each is invested with a serous membrane, the *pleura*, which is continuous at the root of the lungs with a similar membrane which lines the cavity of the chest, the practically non-existent space between the two membranes, which are only separated by a slight film of serous fluid, being termed the pleural cavity. Each lung has a deep fissure running obliquely downwards and forwards in its substance, and the right lung has also a secondary fissure running horizontally from the middle of the greater fissure to the inner border of the lung. The left lung is thus divided into two, and the right into three lobes. Each lung is attached on its inner aspect to the mediastinal wall of the pleural cavity,

at the root, where the blood vessels, bronchi, lymphatics, and nerves enter and leave its substance. The terminal branches of the bronchi end in irregular passages, from the sides of which go off the air-sacs or *alveoli*, which have delicate membranous walls containing a fine network of capillaries. The blood in these capillaries is thus only separated from the air in the alveoli by the slight framework of the walls of the capillaries and the alveoli, being spread by the capillary network over a comparatively large surface, and it is here that the interchange of gases between the air and the blood takes place.

The process of breathing consists in enlarging the chest by raising the ribs to a more horizontal plane and depressing the diaphragm, so as to inspire air into the lungs, the former being the more important factor in women and the latter in men. The movements of the ribs in *inspiration* are produced by muscles attached from the ribs to the skull, vertebral column, and scapulæ. The diaphragm is depressed by the longitudinal curves being straightened through the contraction of the muscular fibres, the central tendon moving but slightly in respiration. In *expiration* the ribs and diaphragm regain their position of rest, and, except the internal intercostal muscles, no special expiratory muscles are called into play in ordinary expiration.

The *chest* acts practically like a bag, which, when it is enlarged, draws in air, and when it is collapsed, drives it out again. The movements of the chest change the air only in the trachea and the larger bronchi, the air-sacs or alveoli not being affected to any extent by the movements, and the air which they contain is renewed by diffusion of gases.

The amount of air which is taken in and passes out at an ordinary respiration is about 20 to 30 cu. in., this being termed the *tidal air*; the *complemental air*, or the amount that can be inspired beyond this by a forced inspiration, is about 100 to 120 cu. in., the *supplemental air*, or the amount that can be forcibly expelled from the chest after an ordinary expiration, is about 100 cu. in.; while the *residual air* is about 100 to 120 cu. in.

The oxygen is held in the blood in chemical combination with the hæmoglobin of the red corpuscles, and is carried in this way from the lungs to the heart and thence by the arteries and capillaries to the various tissues of the body, where it breaks away from the hæmoglobin and is absorbed. Carbon dioxide, on the other hand, is given off by the tissues and is dissolved in the blood plasma and combined with the sodium cabonate in it, forming sodium bicarbonate; this is conveyed by the veins to the lungs.

The composition of pure atmospheric air is 20·9 per cent. oxygen, 79 per cent. nitrogen, 0·04 per cent. carbon dioxide, and a slight quantity of water vapor; the composition of dried expired air is about 16 per cent. oxygen, 79 per cent. nitrogen, and 4·5 per cent carbon dioxide, while it contains, in addition, up to 6 per cent. of water vapor.

The respiration is governed by a nerve center in the medulla oblongata, the lowest part of the brain immediately above the spinal cord, and the nerve by which it is chiefly regulated is the vagus. If the center in the medulla is injured, respiration stops; if the end of the vagus nearer to the brain is stimulated, respiration is quickened; and if the vagus is cut, respiration is slowed. Stimuli through various other nerves, however, may excite the respiratory center, and, reflected to the muscles of the chest and the diaphragm, have an effect upon the respiration; for instance, cold water suddenly dashed on the back of the head causes a person to take a deep inspiration and hold it, while in *artificial respiration* pressure is made upon the chest walls, or the chest is enlarged and compressed alternately by moving the arms or body of the affected person.

Pathology.—The various diseases of the respiratory system will be found described under their different headings—(*e.g.*) Asthma, Bronchitis, Emphysema, Pleurisy, Pneumonia, Tuberculosis. The main general symptoms of diseases of the respiratory system are *pain*, which may be burning, as in bronchitis, or stabbing, as in pleurisy or in pneumonia, the pain in the latter being due to the associated pleurisy; *interference with respiration*, either the respiration being accelerated or difficulty in breathing experienced; *rise of temperature*, to a greater or less extent, a feature common to practically all diseases of the respiratory system; *cough*, generally accompanied by sputum, which may be frothy, as in bronchitis, gelatinous and plum-colored, later of a rusty tinge, as in pneumonia, in disk-like purulent masses, 'mummular,' as in phthisis. When a blueness of the surface of the body or of certain parts is observed, the term *cyanosis* is applied. It is due to a deoxidized condition of the blood which may be caused by obstruction in the artery or in the lung itself, or to valvular disease of the heart, the last-named condition being frequently congenital.

Certain occupations predispose towards diseases of the respiratory system, stone-masons, coal-miners, knife-grinders, mill-workers, and others work-

ing in dusty atmospheres being affected. The particles of stone, coal, or other dust which are inhaled may cause chronic bronchitis, which is followed by emphysema, or they may cause an overgrowth of fibrous tissue in the lung itself this tissue sometimes becoming softened in parts and breaking down to form cavities, a condition known as stonemason's or coal-miner's or knife-grinder's phthisis. Glass-blowers are also liable to bronchitis.

Tracheotomy, or the making of an opening into the trachea or windpipe by cutting into it from the front of the neck, may be necessary because of a foreign body in the air-passages, acute laryngitis causing great swelling of the walls of the air-passages, diphtheritic inflammation, or some similar cause, preventing the passage of air into the trachea by the natural passages. A bent silver double tube is introduced as a means of communication between the trachea and the exterior, the inner tube being loosely in the outer so that it can easily be removed by coughing when sputum is coughed into it.

REST, in music, an interval of silence between notes.

RESTIF, NICOLAS EDME, RÉTIF DE LA BRETONNE (1734-1806), Fr. novelist and printer; pub. more than 200 vol's of licentious nature but skilful description.

RESTIGOUCHE, a salmon river in the N. W. part of New Brunswick, Canada, forming the boundary between Quebec and New Brunswick for 50 m. It rises in Victoria co., and flows 200 m. to Chaleurs Bay in the Gulf of St. Lawrence.

RESURRECTION, the rising again of the body and its re-union with the soul. In its widest sense the belief in the R. is not peculiar to Christianity, and anticipations of it are found in Zoroastrianism and later Judaism. In the older biblical books, in the Pentateuch, the Psalms, and some of the prophets, the trend of thought seems distinctly opposed to the idea of R., sometimes even of personal immortality. The doctrine of the R. developed during the post-exilic times, and in its rise the influence of Persian thought can doubtless be traced. A few biblical references showing the development are: Isa. XXVI. 19; Ezek. XXXVII.; Baruch II. 17, III. 11, 19; Wis. III.; 2 Macc. VII. 9, etc. In apostolic times the belief in R. was one of the lines of demarcation between the Pharisees and the Sadducees (Matt. XXII. 23 ff.), and of this controversy St. Paul took advantage when brought before the Sanhedrim. Christian belief in the R. is founded on the rising of Jesus and His subsequent appearances to the disciples. The preaching of the R. seems, indeed, to have formed a large part of the apostolic mission. The fullest N. T. expositions of the belief occur in 1 Cor. XV. and 1 Thess. IV., where the apostle lays stress upon the spiritual nature of the R. Body.

RETAINER. The object of a R. is to secure the services of a particular lawyer and to bind him not to appear on behalf of the opponent of the litigant who proffers the R.

RETAINING WALL, a wall constructed with the object of preventing the horizontal movement of earth or water. The form and construction of such a wall depend upon the direction and magnitude of the forces which may be expected to be brought to bear upon it.

RESURRECTIONISTS, or **RESURRECTIONMEN,** the familar if blasphemous name given to the ruffians who between 1826-30 gained a precarious livelihood by breaking open graves and selling dead bodies to the teachers of anatomy.

RESUSCITATION. See DROWNING.

RESTORATION. See ENGLAND; FRANCE.

RETFORD, EAST (53° 20′ N., 0° 57′ W.), town on Idle, Nottinghamshire, England; iron foundries. Pop. 13,500.

RETINA. See EYE.

RETORT OVENS. See COKE.

RETREAT: (1) A military bugle or trumpet call sounded at sunset—officially the end of the day's routine. (2) A term used in both Anglican and Roman Catholic churches for a period of retirement dedicated to meditation and prayer.

RETRIEVER DOGS. See DOG FAMILY.

RETROGRADE, a term applied to an apparent motion of a planet among the stars when it is in opposition to the motion of the sun in the ecliptic.

RETZ, GILLES DE, RAIS (1404-40), leader of Fr. resistance to English and protector of Joan of Arc; marshal of France, 1426; kept magnificent mediæval household; a man of horrible depravity; murder and torture of numbers of children disclosed, 1440; hanged; of literary interest for connection with mystery plays and Bluebeard legend.

RETZ, JEAN-FRANÇOIS-PAUL DE GONDI, CARDINAL DE (1613-79), Fr.

Frondeur; member of family which had produced three abp's; coadjutor of his uncle, Abp. pf Paris, 1643; received cardinalate, 1652; arrested, 1652, and fled; returned after Mazarin's death; abandoned claim to archbishopric; made abbot of St. Denis; wrote remarkable *Memoires*.

REUCHLIN, JOHANN (1455-1522), Renaissance scholar; studied Greek at Paris and Basel, and then studied law. In 1492 began to study Hebrew, and to his work the revival of the language was largely due. He was tried for heresy, but at length proceedings against him were annulled. His most famous work was *De Rudimentis Hebraicis*. R. and Erasmus were the greatest scholars of their time.

RÉUNION, ILE BOURBON (21° 5′ S., 55° 35′ E.), island belonging to France, one of group lying to E. of Madagascar; area, 965 sq. miles; surface generally mountainous; has one very active volcano, Piton de Fournaise; drained by many short streams; chief towns, St. Denis (capital), St. Pierre, St. Paul, and St. Louis. R. was first visited by Portug. explorers early in XVI cent. and was settled by French *c.* 1649; occupied by British, 1810-15, when reverted to France. Pop. 1921, 173,190.

REUS (41° 10′ N., 1° E.), city, province Tarragona, Spain; wines; cotton and silk goods. Pop. 26,000.

REUSCH, FRANZ HEINRICH (1823-1900), Ger. Old Catholic divine; prof. at Bonn, 1858; opposed papal infallibility and was excommunicated; wrote theological works—some with Döllinger.

REUSS, two former Ger. principalities, now a part of the State of Thuringia.—Reuss-Greiz is held by elder branch of R. family; area, 122 sq. miles; capital, Greiz; woolens are manufactured and livestock reared. Reuss-Schleiz-Gera belonged to younger branch of R. family; area, 319 sq. miles; capital, Gera; principal industries—agriculture manufacture of woolens. Pop. (combined) 212,000. All princes of R. family were called Heinrich since XI cent.

REUTER, HEINRICH LUDWIG CHRISTIAN, known as Fritz (1810-74), a German dialect poet and story writer. In 1843 he published *Lauschen un Rimels*, a collection of humorous poems which became extremely popular. Next appeared: *Reis nah Bellegen, Kein Husung, Hanne Nute und de lutte Pudel, Schurr-Murr, Dorchlauchting, Urgeschicht von Mecklenborg, Olle Kamellen*, his principal prose work; *Ut mine Stromtid*, his masterpiece; *Lustspiele und Polterabendgedichte*, etc.

REUTER, PAUL JULIUS, BARON DE (1821-99), originator of Reuter's News Agency; *b.* Carsel, Germany; became a naturalized Brit. subject, 1851, and founded his offices in London, with correspondents in all parts of the world.

REUTERDAHL, HENRY (1871), American naval artist; *b.* Malmo, Sweden. He served as newspaper correspondent during the Spanish-American War and also in the early part of the World War. He was made a lieutenant commander of the U. S. N. R. F. in 1918. He has made a specialty of painting naval subjects, and his work is marked by great fire and spirit. He received a silver medal at the Panama Exposition in 1915. He is a member of many artistic and naval organizations. Collections of his works are in the Naval War Colleges and the National Museum, Washington, and also in various art galleries. He executed for the Missouri State Capital the naval mural painting *We Are Ready Now*.

REUTLINGEN (48° 30′ N., 9° 13′ E.), town, on Echatz, Württemberg, Germany; leather manufactures. Pop. 1920, 28,897.

REVAL, OR REVEL, fort. seapt., Esthonia (59° 27′ N., 24° 49′ E.), on Gulf of Finland; cap. of Esthonia; among chief buildings are the castle, cathedral, and churches of St. Olai and St. Nicholas; chief manufactures are cotton, paper, leather, and hosiery; chief exports, grain and flax; has had a varied history, being founded *c.* 1220 as a Dan. town, sold in 1346 to the Teutonic Knights, becoming Swedish in 1561; captured by Peter the Great in 1710. During World War bombed and raided and occupied by Germans, Feb., 1918. The rebuilding of the port began in Jan., 1919. Pop. 160,000.

REVEILLE, a bugle, trumpet, or drum call, sounded at daybreak to rouse soldiers or sailors from sleep; officially the beginning of the day's routine.

REVELATION, BOOK OF, OR THE APOCALYPSE ('uncovering,' 'unveiling'). Early Christian tradition assumed that the author was John the Apostle; much external evidence supports this theory, although there is also evidence in the opposite direction. The internal evidence creates a difficulty, style, contents, and outlook differing extensively from that of the fourth gospel. The authorship cannot be stated with certainty, all that is known being that the author's name was John, that he was a

sufferer along with those to whom he was writing, and that he had been banished to Patmos. The book is usually assigned to the reign of Domitian (A. D. 81-96).

Apocalyptical writings had their rise in the centuries immediately preceding and following Christ; they sprang up in difficult times, and brought a message to suffering people that help would arrive, and counselled them to abide in patience and hope. The Book of Revelation was the most outstanding of these, and is the only one which has been accepted in the canon of the Bible. Several different modes of interpreting the book have been adopted. The 'futurists' believe that the end of the world is dealt with, and that the events named are connected with this in the dim and distant future; the historical view is that a symbolical narrative of the Church's history is set forth from its early days till the end of the world; the 'preterist' schools hold that the writer was dealing only with his own times, and seeking a means of escape from immediate difficulties by fixing his belief on Divine intervention; they therefore maintain that the promises have already been nearly or entirely fulfilled.

REVELSTOKE (50° 30′ N., 118° W.), town, Brit. Columbia; mining industries; railroad shops. Pop. 3,700.

REVENTLOW, CHRISTIAN DITLEV, FREDERICK, COUNT (1748-1827), Dan. statesman; pres. of *Rentekammeret*, 1784; carried out agrarian reforms; obtained appointment of royal commission, 1786, to inquire into condition of peasantry; result—abolition of feudal services; introduced free trade measures, fell, 1813.

REVENTLOW, ERNST ZU, COUNT (1869), Ger. publicist, of Dan. extraction; entered Ger. navy, but became naval expert on staff of *Berliner Tageblatt* and other newspapers, and a prominent advocate of Pan-Germanism; during World War was frenzied in demands for frightfulness on sea and land.

REVENUE. See INTERNAL REVENUE; TARIFF; TAXATION.

REVENUE CUTTER SERVICE, UNITED STATES, a fleet of vessels maintained by the U. S. Federal Government, under the jurisdiction of the Treasury Department, used primarily to prevent smuggling. The idea of such a service was first conceived by Alexander Hamilton, in 1790, who was then Secretary of the Treasury, and was immediately put into effect by Act of Congress. At the time the United States had no fighting vessels and from 1790 until 1797, when the frigate 'United States' was launched, the vessels of the Revenue Service constituted the only armed vessels of the United States on the seas. The Act of Congress establishing the Service authorized a fleet of ten vessels, armed and equipped, the officers holding the same grades as those in the Navy. During times of peace it is the duty of these vessels to guard the coasts against illicit traffic, and in the absence of war vessels to represent the interests of the United States. Our possessions in Alaska have been almost entirely under the protection of the Revenue Service. Revenue cutters have also been prominent in rescue work at sea and are usually the first to respond to calls for help from vessels in distress. Since 1915 the Coast Life Saving Service and the Revenue Cutter Service have been amalgamated.

REVERE, a city of Massachusetts, in Suffolk co. It is on the Boston and Maine Railroad and is a suburb of Boston, which it joins on the northeast. It has an excellent beach on which the State has constructed a magnificent public bath-house. It is a favorite summer and bathing resort. Among the public buildings are a city hall and a library. Pop. 1920, 20,823.

REVERE, PAUL (1735-1818), an American Revolutionary patriot; *b.* in Boston. At the age of 21 he was a lieutenant in the Crown Point Expedition, but soon after he learned the trade of goldsmith and became an expert engraver on silverware. He engraved the plates for and printed the money ordered by the Provincial Congress in 1775. He participated in the 'Boston tea party,' and was otherwise very active in the movement against England. In the night of April 18-19, 1775, at the request of Joseph Warren, he rode to Lexington to warn Hancock and Samuel Adams of the approach of British troops. Passing on to warn the patriots in Concord, he was there arrested by the British, but was released next day. It was this feat which was immortalized in Longfellow's poem. During the Revolution he served as a lieutenant-colonel of artillery, participating in the unsuccessful Penobscot expedition.

REVEREND, a title of respect generally accorded to all clergy, and ministers of religion.

REVERBERATING FURNACE. See FURNACE.

REVERSION, in heredity, the name given to the biological fact that the species revert in some of their peculiarities to ancestral forms. Children, for example, often revert in certain particulars, both physical and moral, to their

grandparents, or even more remote ancestry; again, Darwin considers that the slaty-blue pigeons which occasionally appear in all breeds are an instance of R., and that the inference of such fact may be drawn from the number of the markings correlated with the blue tint, because of the improbability that all the markings would appear together from a simple variation. See EVOLUTION.

REVILLAGIGEDO (19° 25′ N., 110° 30′ W.), group of islands, N. Pacific, belonging to Mexico; mostly uninhabited.

REVIVAL (of religion), a name now used for various religious movements which caused a renewal of zeal and fervor in the cause of religion, such as, for example, the Crusades and the early work of the Jesuits. The term, however, is a modern one, and is, perhaps, best used only in its modern connection. In this case, Rs. are a feature of Protestant church life by which, under the influence of vigorous and fervid preaching, conversion of heart is felt by the unconverted and additional zeal is stimulated in church members. The 'Great Awakening' was the great R. of America, and is specially connected with the name of Jonathan Edwards. In England the names of Wesley, Whitfield, Moody and Sankey, Evan Roberts, and Torrey and Alexander are also well known in connection with religious Rs.

REVIVAL OF LEARNING. See RENAISSANCE.

REVOLUTION, the name given to a change in the internal constitution and government of a country, when brought about by the concerted and more or less violent action of the inhabitants. In the history of the world such Rs. have taken place innumerable times, and against widely different forms of government, but there are a few which stand out as of more importance than the rest. Such are the R. in England in 1688, when William of Orange came to rule over England; the American R. of 1776, when England was obliged to give America her independence; the French R. of 1789, when the downfall of the Bourbons inaugurated one of the most sanguinary epochs in modern history. In addition to these Rs. of world-wide importance and effects, each country has its memories of Rs., landmarks in the nation's history. To cite a few dates: in Spain, 1868 and 1874; in Russia, 1762; in Poland, 1704, 1795, and 1830; in Norway, 1905; in Russia, 1917; in Germany, 1918.

REVOLVER, a small firearm to be held and fired with one hand, and designed for use at close quarters; invented about 1570. Earliest form was a double-barreled weapon, but about a century later we find pistols with three barrels which were unscrewed to load. When more than three barrels came to be used, they were grouped round a solid core. Eventually, however, the barrels were made to revolve so as to come successively opposite to the hammer. The first really serviceable revolver, as these came to be called, was that made by Samuel Colt, a native of Hartford, Conn., some time after 1835. The original colt had muzzle-loading chambers, and the introduction of the breech-loading chamber, which came shortly thereafter was an important step in advance. Various improved types of revolver have since been introduced by other inventors.

The latest type of pistol to be used is the 'automatic,' which relieves the firer of all manipulation, except the replenishing of the magazine, taking aim, and pressing the trigger, but its special dangers are that the recoil is apt to cause another shot to be fired unintentionally, and that when the catch which holds the hammer gets worn, the whole contents of the magazine may be discharged automatically. Automatics have also the defect that the small bullet used has not always sufficient 'stopping power'—an important disadvantage in close-quarter fighting.

REWA (24° 31′ N., 81° 20′ E.), native state, Baghelkhand, Central India. Pop. 1,401,000. Capital, Rewa. Pop. 26,000.

REWA KANTHA (22° 30′ N., 73° 30′ E.), collection of native states, Bombay, India. Pop. *c.* 480,000.

REWARI (28° 12′ N., 70° 40′ E.), town, Gurgaon district, Punjab, Brit. India; trade in grain. Pop. 30,000.

REXDALE, ROBERT (1859), lecturer, author. Educated in the public schools of Portland Me. Learned the printer's trade and newspaper work. Assistant editor of a Portland paper, 1885-92, 1893. Removed to Peoria, Ill., and was interested in traveling lecture work. Since 1918, telegraph editor of an Iowa paper. Editor of *Under the Jungle Tree,* in a magazine from 1914-18. Author of *Drifting,* 1887; *Rhymes,* 1904; *The Book of Bohemia,* 1913; *Quest of a Master Mason,* 1915. Wrote for various magazines and among his works are, *At Low Twelve, The Message of the Flag, When the Mississippi Was the Great Highway, To Our Absent Brothers, Yuletide.*

REXFORD, EBEN EUGENE (1848-

1916), an American writer; *b.* in Johnsburg, N. Y. He graduated from Lawrence University, in Appleton, Wis., but had already begun writing before that. His books include *Brother and Lover* (verse), 1886; *John Fielding and His Enemy*, 1888; *The Swamp Secret*, 1897, and *Flowers; How to Grow Them*, 1898. He is best known for his song *Silver Threads Among the Gold*.

REYES, RAFAEL, (1852-1921) a president of the United States of Columbia; *b.* in Santa Rose de Viterbo, Boyaca, Columbia. In 1903, when Reyes had already been Minister of the Interior and had represented his country in France and Switzerland, and as delegate to the Second Pan-American Conference, held in Mexico, and when Columbia, having renounced the treaty by which the United States wished to gain a concession for building the Panama Canal, with the result that Panama seceded, Reyes was sent to Washington to 'save what he could from the wreck.' On his return he urged upon his countrymen to recognize that they had blundered. That he succeeded was evident from the fact that he was elected president, which position he held till he resigned, in 1910. He wrote *The Two Americans*, 1914.

REYKJAVIK (64° 8′ N.; 21° 55′ W.), capital of Iceland.

REYNARD THE FOX, an epic of animal life common to French, Dutch, and German Romance. Of this story there were various versions, but all are based upon the cunning of Reynard the Fox directed against his enemy, Isengrim the Wolf, who was chief informer against him at the court of the Lion, king of beasts.

REYNOLDS, ERNEST SHAW (1884), botanist; *b.* at Glendale, Mont. In 1907 graduated from Brown University. 1909-12 at the University of Tennessee as instructor and assistant professor of botany. Since 1912 associate professor and professor of botany at the Agricultural College of North Dakota and since 1920 plant physiologist at the North Dakota Agricultural Experiment Station. Was special agent of the United States Department of Agriculture summers.

REYNOLDS, JOHN FULTON (1820-63), an American soldier; *b.* in Lancaster Pa. He graduated from the West Point Military Academy, in 1841, served during the Mexican War and at the outbreak of the Civil War was Commandant of the West Point Academy. Entering active service as a brigadier-general of Volunteers, he commanded a corps in the Army of the Potomac, participated in the Battle of Fredericksburg. He was chief in command of the Federal forces engaged in the Battle of Gettysburg during the first half of the engagement, when he was killed.

REYNOLDS, JOHN HUGH (1869); college president; *b.* at Enola, Ark. Graduated from Hendrix College in 1893, Conway, Ark. Since 1913, president of Hendrix College, Conway, Ark. In 1903 organized the Arkansas Historical Association and since then secretary. Author of laws in 1905 and 1909 creating temporary and permanent Arkansas Historical Commission and secretary from 1905-11. In 1920-21, director general of the Christian Education Movement of the Methodist Episcopal Church to raise $33,000,000 for Colleges. Author of; *Makers of Arkansas History*, *Civil Government of Arkansas*, *History of the University of Arkansas* (with D. Y. Thomas). Wrote for magazines and *The South in the Building of the Nation*.

REYNOLDS, JOSEPH JONES (1822-99), an American soldier; *b.* in Flemingsburg, Ky. He graduated from West Point Military Academy, resigned from the Army to become a teacher of mathematics, but entered the Federal Army at the beginning of the Civil War as a brigadier-general. He participated in the battles of Chickamauga and Chattanooga, and during January-June, 1864, had command of the defenses of New Orleans.

REYNOLDS, SIR JOSHUA (1723-92), painter; *b.* near Plymouth, studied in England and in Italy, established himself in London, and became so successful that in 1755 he had 120 sitters. Though he worked in other departments, it was as a portrait-painter that he excelled. His pictures of children have a peculiar tenderness and beauty, and his greatest portrait, that of Mrs. Siddons as 'The Tragic Muse,' remains unsurpassed for many distinctive qualities. At the foundation of the Royal Academy in 1768, he was elected President, and in 1784 was made painter to the King. He founded the famous literary club of which Johnson, Goldsmith, and Burke were members, and his name figures prominently in Boswell's *Johnson*.

REYNOLDS, ROBERT M. (1826-85), an American lawyer and diplomat; *b.* in Muskingum co., Ohio. He was educated privately, removed to Illinois in 1847 and in 1851 to Ohio. A teacher of mathematics and a principal of an academy for ten years. He also studied law. He enlisted at the start of the Civil

War in the 1st Iowa Cavalry and by reenlistment in 1864 became a veteran. He was three times wounded in action and in 1865 mustered out of the service as a brigadier-general by brevet. In that year he settled in Alabama and was a member in 1867 of the state constitutional convention. Admitted to the bar in 1867 and in 1868 he was elected auditor of the state, serving more than four years. From 1874-77 he was Minister Plenipotentiary to Bolivia. In 1878 he was appointed First Auditor of the United States Treasury and served until March, 1885.

REZÁNOV, NICOLAI PETROVICH DE (1764-1807), Russ. diplomatist and financier; obtained charter for Russian-American Fur Company; obtained great wealth as promoter, and sought to extend Russ. territory in hunting districts of Western North America; untimely death prevented realization of plans.

RHADAMANTHUS (classical myth.), *s.* of Zeus and Europa; because of his justice he was made a judge of the dead in Hades.

RHÆTIA, RÆTIA, former country of Central Alps; inhabitants thought immigrant Etruscans; Rom. province, 5 B. C.

RHÆTIC BEDS, uppermost strata of Triassic, or lowest Liassic, systems; found in England, Germany, but most extensively developed in Rhætian Alps; highly fossiliferous, especially in marine remains, the characteristic being *avicula contorta,* while Celemontes make their first appearance.

RHAMNACEÆ, natural order of trees and shrubs; two genera: *Rhamnus* (Buckthorn), used in dyeing as an astringent; and *Zizyphus,* the lotus of antiquity.

RHAPSODISTS, in ancient Greece, itinerant reciters of epic poetry; competed at games and festivals; wore rich robes; possibly the earliest r's composed epics, but later ones merely declaimed Homer (*e.g.*), Plato's *Ion.*

RHATANY (*Krameria*), plant of order Polygaleæ; roots of Peruvian R. and Savanilla R. are used as strong astringent.

RHEA. See under RUNNING BIRDS.

RHEAD, LOUIS JOHN (1857), an Anglo-American artist; *b.* in Etruria, England. He studied in the Art Training School, in South Kensington, London, came to the United States in 1883 to become art manager for the publishing firm of D. Appleton & Co. He paints in oils and water colors and has done considerable illustrating, especially for a series of juvenile classics. He has written *The Book on Fish and Fishing,* 1908; *American Trout Stream Insects,* 1916; and *Fisherman's Lures,* 1920.

RHEES (BENJAMIN), RUSH (1860), an American university president; *b.* in Chicago, Ill. He graduated from Amherst College, in 1883, was the instructor in mathematics there for two years, entered the Baptist ministry in 1889, and became pastor of the Middle St. Church, in Portsmouth, N. H. Since 1900 he has been president of the University of Rochester. He has written *The Life of Jesus of Nazareth, a Study,* 1900, and *St. Paul's Experience as a Factor in His Theology,* 1896.

RHEGIUM, REGIUM (modern Reggio Di Calabria) (38° 5′ N., 15° 40′ E.), ancient city, on coast of Bruttium, S. Italy; founded by Chalcidians and Messinians, VIII. cent. B. C.; became a Rom. colony, III. cent. B. C.

RHEIMS. See REIMS.

RHEINE (52° 16′ N., 7° 25′ E.), town, on Ems, Westphalia province, Prussia; manufactures cotton. Pop. 15,000.

RHENISH PRUSSIA. See RHINELAND.

RHEOSTATS are devices which make possible the easy variation and control of the resistance of the electrical circuit in which they are placed. This, of course, produces a variation of the current flowing. One common type consists of a number of fixed resistances, connected together. The junction points are connected to a series of metal studs arranged in a circle on a panel of slate or other nonconducting material. A contact arm pivoted at the center of the circle touches each of the studs as it is rotated, thus varying the number of units in the circuit. Another type consists of a series of carbon plates or a quantity of granular carbon, whose resistance varies as the pressure applied to it.

RHETORIC is the art of public speaking. The popular assemblies of the Gk. states made it essential for all men to be able to express their thoughts lucidly and correctly, and hence among the ancients the art was widely cultivated and highly esteemed. R. was first taught in Sicily by Corax and Tisias, about the year 460 B. C., in order to assist those involved in the many lawsuits which the redistribution of land at that period had occasioned. Gorgias brought the art to a pitch of high perfection, but he was essentially a stylist and cared little about the content. R. was one of the chief subjects taught by

the sophists, but it was Aristotle who first raised the study to the dignity of a science. His *Rhetoric* survives, and consists of three books containing copious illustrations from Gk. rhetoricians and writers. The first two books are mainly devoted to *proofs*, but the third which treats style is the most interesting. Of the Attic orators, Antiphon, Lysias, and Isocrates are famous, but Demosthenes is on a plane by himself. Among the Romans the art was cultivated assiduously, being in harmony with Rom. ideals and temperaments.

Cicero extends the sphere of r. to include the formation of a man's character and the entire field of his studies. His best works on the subject are the *De Oratore* and the *Brutus*. *The Rhetoric* of Quintilian is an exhaustive manual dealing with r. on the broad basis defined by Cicero. In modern times r. has not received the close attention it received in classical times.

RHEUMATISM, term popularly applied to a number of conditions characterized by pain, more accurately differentiated as acute, chronic, and muscular.

Acute Rheumatism or Rheumatic Fever is an acute fever due to a toxic condition of the blood caused by a micro-organism, the chief symptom in *adults* being the affection of the joints, which become swollen, reddened, hot, and tender, first one of the larger joints (knee, ankle, shoulder) being affected, then some of the others, often in symmetrical order. At the same time the temperature rises, accompanied by other symptoms, and the heart may become affected, but the latter is not so usual as in children. In *children* the affection of the joints is slight, the other symptoms are not so marked, and the patient does not seem very ill. There is, however, a particular liability to affection of the heart and pericardium, and the heart must be frequently examined by a physician. The presence of fibrous nodules under the skin is also often a characteristic of the disease in children. The *treatment* is to put the patient to bed between blankets, give a dose of calomel, and keep the affected joints at rest, wrapped in cotton wool. Salicylate of soda has a remarkable effect in relieving pain, reducing the temperature, and shortening the course of an attack. Alkaline drinks in liberal quantities are also of benefit. Aspirin is a valuable substitute for salicylates.

Chronic Rheumatism may follow one or more acute attacks, or it may be chronic from the beginning, sometimes several joints being affected, sometimes only one. The capsule, tendon sheaths, and ligaments are thickened, and there is a tendency towards adhesions and fibrous thickenings in the joint, which may be somewhat distorted. There is no tendency to heart or kidney affections. The treatment is to give potassium iodide, quinine, cod-liver oil internally; massage and the use of iodine and other liniments. Alcohol of any kind and sugar should be avoided in the diet, while Turk. baths, hot-air or hot-sand baths are of benefit.

Muscular Rheumatism usually comes on suddenly with pain in certain groups of muscles, with little or no swelling, often accompanied by digestive disturbances, the chief varieties being *lumbago* (affecting lower part of the back), *intercostal rheumatism* (affecting the muscles between the ribs), and *torticollis* (affecting one side of the neck), gouty or rheumatic persons being generally affected. The treatment is to administer calomel and saline purges, while sodium salicylate, quinine, and potassium iodide are of benefit. Counter-irritants (*e.g.*, iodine or mustard leaves) should be applied locally, and rest is necessary. Massage, electricity, and mineral baths have been found valuable; diet should be kept simple, alcohol and sugars being avoided.

RHEUMATOID ARTHRITIS, OSTEO-ARTHRITIS, OR ARTHRITIS DEFORMANS, is a disease characterized usually by a chronic course and destructive changes in the joints, the cause of which is believed to be either a micro-organism or toxæmia due to absorption of toxins from the alimentary canal. It may assume one of several types: in the most common form the tissues around the joint and the synovial membrane of the joint are involved, the joints are swollen, painful, and tender, and there is often fever. Later, there may be a certain amount of muscular atrophy, the skin is glossy and pigmented, and the joint may become deformed. In the *atrophic* type, which is rarer and more serious, there is atrophy of bone and of cartilage in the joint, which becomes disorganized and usually ankylosed. In the *hypertrophic* type new bone is formed, projecting around the joint and sometimes leading to ankylosis, while there are also changes in the cartilage. In a type which usually affects children (*Still's disease*) there is usually fever in the acute stages, and in addition to the swelling of joints, swelling of the lymph glands and the spleen, accompanied by anæmia, muscular wasting, and limitation of movement.

RHEYDT (51° 11′ N., 6° 28′ E.), town, Rhineland, Prussia, on Niers; textiles. Pop. 44,000.

RHINE (Lat. *Rhenus*, Ger. *Rhein*

Dutch, *Rhijn*), the chief river of Germany, and one of the most important in Europe, is about 800 m. in length, of which 250 m. are in Switzerland, 450 m. in Germany, and 100 m. in Holland; it drains an area of 75,000 sq. m. Rising in Switzerland and flowing W. N. W. across Europe, it separates that country from Germany, flows through Germany and the Netherlands to the North Sea. The R. was anciently the natural defense of the Roman empire against the Teutonic hordes, who, however, in the 4th century, swept away the elaborate fortifications which the Romans had raised. With the partition of the Frankish empire of Charlemagne, 843, the R. became a Germanic river. France, however, through the peace of Westphalia, obtained a footing on the l. b. In 1801 the l. b. of the river was formally ceded to France, but not till the war of 1870-71 did Germany regain full possession of both banks of the R. The R. was an important strategic point for Germany during the World War, and during the occupation of the Rhineland in the years following it was strongly guarded by Allied troops. The R. territory of the Ruhr was occupied by the French in 1923. See RUHR, OCCUPATION OF.

RHINELAND, RHINE PROVINCE, OR RHENISH PRUSSIA, most westerly prov. in Prussia (*c.* 49° 12′-51° 54′ N., 6°-7° 45′ E.); between Belgium and Luxemburg on the W., and Hesse-Nassau and Westphalia on the E.; drained by the Rhine and its tributaries; wine extensively produced in the valleys of the Rhine, Moselle, and Saar; sugar, hops, and flax are grown, and fruit abundant; most important occupations are mining and manufacturing; chief minerals are coal and iron; manufactures include iron, brass, and steel goods, cutlery, textiles, chemicals; chief towns are Koblenz (cap.), Essen, Duisburg, Düsseldorf, Cologne, Elberfeld-Barmen, Crefeld; mineral springs at Aachen, Kreuznach, etc. Area, 10,420 sq. m.; pop. 1920, 6,769,469. The Ruhr region which includes the richest mineral fields of Germany was seized by the French in 1923. An attempt was made in Oct. and Nov., 1923, to establish a separate republic. See RUHR.

RHINELANDER, a city of Wisconsin, in Oneida co., of which it is the county seat. It is on the Chicago and Northwestern, and the Minneapolis, St. Paul and Sault Ste. Marie railroads, and on the Wisconsin river. Its industries include saw mills, paper mills, iron works, etc. Pop. 1920, 6,654.

RHINELANDER, PHILIP MERCER (1869), an American Protestant-Episcopal bishop; *b.* in Newport, R. I. He graduated from Harvard University in 1891; studied at Oxford University in England; was ordained a priest in 1897; was in charge of St. Mark's Church, in Washington, D. C., during 1896-1903; was on the faculty of the Berkeley Divinity School, in Middletown, Conn., during 1903-07; was professor of the history of religion and missions at the Episcopal Theological School, in Cambridge, Mass., during 1907-11, after which he became Bishop of Pennsylvania.

RHINOCEROS (Rhinocerotidæ), a genus and family of large odd-toed or perissodactyle ungulate mammals, with five species found only in Africa, N. E. India, Burma, Malay, Sumatra, Borneo, and Java. They are shy nocturnal creatures, with thick skins and one or two upright horns on or behind the snout. They live on foliage and the young shoots of trees, and are often found wallowing in muddy pools or in rivers.

RHINOPLASTY, a plastic operation to replace lost tissue in the nose by tissue from some other part of the patient's body.

RHIZOME, in botany, a stem running along the surface of the ground or partly underneath, which sends forth shoots at its upper end while it decays at the other end.

RHIZOPODA (Gk. *rhiza*, a root; and *podos*, a foot), a sub-class of the simplest class (*Sarcodina*) of the Protozoa. Its members are distinguished by the possession of pseudopodia, which are mobile, branched, and root-like (hence the name), in contradistinction to the unbranched, ray-like pseudopodia of the *Actinopoda*.

RHODE, PAUL PETER (1871), bishop; *b.* in Prussian Poland. In his youth he came to America and studied at St. Mary's College, St. Ignatius, Chicago, and was a graduate of St. Francis College. Ordained in 1894 a priest of the Roman Catholic Church. Pastor from 1896-1909 at St. Peter's, St. Paul's and St. Michael's Churches in Chicago. In 1908 consecrated bishop of Barca and in 1908-15 an auxiliary bishop of the Archdiocese of Chicago. Appointed bishop of the Green Bay Diocese, 1915, and from 1909-15 vicar general of the Archdiocese of Chicago.

RHODE ISLAND, one of the thirteen original states of the U. S. A. (41° 18′-42° 3′ N., and 71° 8′-71° 53′ W.), bounded on the N. and E. by Massachusetts, on S. by Atlantic Ocean, on W. by Connecticut. Surface generally rough and hilly (highest point, Pine Hill, 760 ft.); divided into two unequal

portions by Narragansett Bay, with islands including Aquidneck or Rhode I. (summer resort). Is dotted by numerous lakes; watered by Blackstone, Pawtuxet, and Pawcatuck rivers. Climate fairly equable, but extremes greater inland. Mean ann. rainfall is 45 to 50 in. Composed mainly of Archæan (granites and gneisses) and Palæozoic rocks; eastern part carboniferous. Mineral deposits are comparatively small; fisheries (oysters) very important. Chief crops: hay and forage; corn, potatoes, oats, vegetables, and fruits (apples) are largely grown. Pre-eminently a manufacturing state, the following are the chief industries: woolen, worsted, and felt goods, cotton goods, jewelry, foundry and machine shop products, electrical machinery, silverware and plated goods, gold and silver reducing and refining. Railway mileage, 212; electric railway 372. Education is obligatory. Providence is the largest and most important city. Pawtucket, Woonsocket, and Warwick specialize in textiles. Legislature consists of senate of 38 members besides the governor and lieut.-governor, and a house of representatives of 100 members (elected annually). Permanently colonized by Roger Williams and other settlers from Massachusetts, 1636; incorporated as Brit. colony, 1663; took active part in War of Independence and temporarily occupied by British, 1776-79; admitted to Union as original state, 1790. Area, 1,248 sq. m. (smallest state in the union); pop. 1920, 604,397; density of pop., 508·5 per sq. m. of land surface, exceeds that of any other state. See MAP, U.S.

RHODE ISLAND, an island in Narragansett Bay. It comprises three townships and is a favorite summer resort. It is 15 miles long and 3½ miles wide. From it the State of Rhode Island derives its name.

RHODES, RHODOS (36° 10′ N., 28° E.), island belonging to Italy in Ægean Sea; area, 423 sq. miles; surface mountainous, reaching extreme height of 4,560 ft. in Mt. Atairo; considerable area wooded; climate mild; capital, Rhodes, long celebrated for its Colossus. The island was originally peopled by Greeks, and afterwards passed into hands of Persians, Saracens, and Knights of St. John; the last-named held it for over two cent's, but finally surrendered it in 1522 to the Turks; occupied by Italians, 1912. Trade is now unimportant, as the two harbors have been neglected and are sand-choked. Pop. 33,000; (town) 10,500.

RHODES, CECIL JOHN (1853-1902), Brit. colonial statesman; *b.* at Bishop Stortfort, Herts; *s.* of clergyman; sent to Natal for health, 1871; with *bro.* Herbert made fortune in Kimberley diamond fields; founded De Beers Mining Co., 1880; early formed plan of making S. Africa British and linking it with Brit. protectorate of Egypt; entered Cape politics, 1881; negotiated, 1883, surrender of territories in Bechuanaland; obtained Brit. troops which secured establishment of Brit. protectorate of Bechuanaland, 1884; established, with Rudd, Gold Fields of South Africa Co., 1886, and British South Africa Co. with Rothschild; through Sir Hercules Robinson secured for Britain pre-emption of Matabeleland, 1888; obtained charter for South Africa Co. ('Chartered Co.'), 1889. The company occupied Mashonaland, 1890, extended influence to great lakes, and built up what is now known as Rhodesia.

R. became prime minister at Cape, 1890; advocated policy of 'Equal rights for all civilized men south of the Zambezi,' regardless of color; strove to conciliate the Dutch; Jameson Raid, 1895, forced him to resign, 1896; quelled Matabele revolt, 1896; censured by parliamentary inquiry for not preventing Jameson Raid, 1897; chief promoter of Cape to Cairo railway and trans-African telegraph line; present in siege of Kimberley, 1899-1900, when his health broke down. Public-cpirited, energetic, autocratic, R. was a great 'empire-maker.' With his immense fortune he endowed 175 Rhodes Scholarships (for British Colonial, American, and German students) at Oxford.

RHODES, CHARLES DUDLEY (1865), an American army officer; *b.* in Delaware, Ohio. He graduated from the West Point Military Academy, in 1889, served in the Sioux Indian campaign in the Cuban campaign during the Spanish-American War, in the China Relief Expedition, in 1901, and during the war against Germany had command of the 42nd and 34th divisions of the American Expeditionary Forces in France, when he had reached the rank of major-general.

RHODES, EUGENE MANLOVE (1869), an American author; *b.* at Tecumseh, Neb., *s.* of Hinman and Julia Manlove Rhodes. He was educated at the University of Pacific, San José, Cal. He was a cowboy in New Mexico for 25 years and began writing for publication in 1906. Author *Good Men and True*, 1911; *Bransford in Arcadia*, 1913; *The Desire of the Moth*, 1916; *West is West*, 1917, and *Stepsons of Light*, 1921.

RHODES, HARRISON (GARFIELD) (1871), an American author, *b.* in Cleve-

land, Ohio. He graduated from Harvard University, in 1893, went into the publishing business and for a while was a literary agent in London, representing American publishers. He dramatized *Ruggles of Red Gap*, by Harry Leon Wilson, in 1915. Among his works are *The Lady and the Ladder*, 1906; *High Life*, 1920, and *American Towns and People*, 1920. He has also written a number of popular plays, among these being *A Gentleman from Mississippi*, and *The Whirl of Society*.

RHODES, JAMES FORD (1848), an American historical writer, *b.* in Cleveland, Ohio. He studied at the University of Chicago, without graduating, and soon after began writing. Among his works are *A History of the United States, from the Compromise of* 1850 (7 vols.), 1893; *A History of the Civil War*, 1917, and *A History of the United States from Hayes to Mc Kinley*, 1919.

RHODES SCHOLARSHIPS, THE, a system of free tuition established by the will of Cecil John Rhodes providing in perpetuity for the support of a number of students at Oxford University, in England, for three years each. The object of the donor was to create a cultural bond between the English-speaking peoples. Because the German Government had made English compulsory in the German schools, Germany was also included. The scholarships are granted in the following colonies and countries: Rhodesia, 9; Cape Colony, 12; Natal, 3; Australia, 18; New Zealand, 3; Canada, 6; Newfoundland, 3; Bermuda, 3; and two in each state and territory of the United States, making a total of 104. Germany was allotted 15, but since the World War these have been cancelled and apportioned between Canada and South Africa. Examinations are held each year, under the supervision of special committees. The successful competitors are then allowed $1,500 a year, for three years, for tuition fees and living expenses at Oxford. Candidates must be between the ages of 19 and 25 and unmarried.

RHODESIA, terr. of British S. Africa Co. in South-Central Africa (3°-22° S., 22°-33° E.), named after founder, Cecil Rhodes; bounded N. by Belgian Congo and Tanganyika Terr., E. by Nyasaland and Port. E. Africa, S. by Transvaal and Bechuanaland, W. by S. W. Africa Protectorate and Angola; length, *c.* 980 m.; breadth, 600 m.; area, *c.* 445,000 sq. m. Terr. is divided into (1) *Southern Rhodesia*, containing the provinces of Matabeleland and Mashonaland; area, 149,000 sq. m.; pop.; Europeans *c.* 33,500, natives 770,000; and (2) *Northern Rhodesia*, until 1911 divided into N. E. and N. W. Rhodesia or Barotseland; area, *c.* 296,000 sq. m.; pop. Europeans 3,500, natives 928,000. The Zambezi separates N. and S. Rhodesia. Surface consists mainly of an elevated plateau from 3,000 to 5,000 ft. above sea-level; Inyana plateau in S. Rhodesia *c.* 5,000 ft.; Tanganyika and Matoka plateaus highest elevations of N. Rhodesia. Chief rivers are Zambezi, Luangwa, Kafue; large lakes are Bangweolo and part of Tanganyika and Mweru; many swamps; climate is sub-tropical; tableland healthy, river valleys and low-lying country unhealthy, malaria being very prevalent; sleeping sickness in some districts owing to tsetse fly; rainy season between Oct. and April. Fauna is that of tropical Africa; affords splendid big-game shooting; includes eland, kudu, giraffe, zebra, baboon, elephant, hippopotamus, rhinoceros, lion; numerous reptiles, butterflies, and birds; white ants and locusts abound and are very destructive. Vegetation generally is sub-tropical; extensive forests; immense tracts of grass and large stretches of country suitable for pasturage and agriculture.

Of utmost importance for development are railways. Cape-to-Cairo railway traverses terr. Rhodesian and Mashona railways begin at Vryburg (Bechuanaland), pass Bulawayo, Victoria Falls, Wankie coalfields, and cross Congo border. Another important line runs from Bulawayo via Salisbury and Umtali to E. coast at Beira (Port.); small branches link main lines with mining districts; line projected from Salisbury across Lomagunda goldfield to W. line at Semalembue; total railway mileage, 2,463. Chief products are wheat, corn, cotton, coffee, rice, rubber, tobacco, timber, ivory; cattle raising is important in S. Rhodesia; rich in minerals, which are already extensively worked; gold, silver, copper, coal, lead, chrome iron, diamonds, asbestos; the country is being rapidly developed and is of great promise.

Rhodesia is under the administration of Brit. S. Africa Co.; S. Rhodesia is governed by administrator and executive council (not less than three members) appointed with secretary of state's approval, and legislative council of administrator and six members appointed by the company with secretary of state's approval and twelve members elected by registered voters; N. Rhodesia is administered by resident commissioner appointed by N. Rhodesian Order in Council, and administrator appointed by Brit. S. Africa Co. with secretary of state's approval; feeling in Rhodesia is

as yet adverse to the suggested incorporation in the Union of S. Africa. Principal towns are Salisbury (cap. of S. Rhodesia), Bulawayo, Victoria, Umtali, Gwelo; Livingstone (cap. of N. Rhodesia), Fort Jameson, Abercorn, and Fife. See MAP, AFRICA.

History.—Numerous anc. ruins show Rhodesian gold mines were worked in very early times—some say in Solomon's days; Rhodesia probably old Empire of Monomotapa; Portuguese entered Mashonaland (16th cent.); Matabele overwhelmed pastoral tribes (1836 onwards); region explored by Livingstone; Brit. S. Africa Co. obtained charter, 1889; Mashonaland administered under Rhodes, Matabele rebellion, 1893; Shangani R. disaster, 1893; King Lobengula died in 1894; name of Rhodesia officially adopted, 1895; Jameson Raid, 1895; Matabele again revolt, 1896; Protectorate proclaimed over N. W. Rhodesia, 1900. Rhodesia contributed men during the S. African War, 1899-1902; during the World War Rhodesian police occupied the Caprivi Concession, Sept., 1914; shared in defense of Saisi, June, 1915, and in campaigns of S. W. and E. Africa; of total males of all ages (15,580) 4,250 served outside the terr.

RHODIUM. Rh. atomic weight 102·9. A rare metallic element belonging to the platinum group. It is found with other platinum metals in Russia, California, South America and Australia. It was first discovered in 1803 by Wollaston. It resembles the other metals of the same group in being a hard, silvery-white solid, malleable and ductile. It melts at about 2000° C. and has a specific gravity of 12·1. When pure, it is not affected by strong acids, but when alloyed with other metals it is sometimes dissolved by aqua regia. It is used in the preparation of alloys, which are employed in thermo-couples for pyrometers.

RHODODENDRON (Gk. 'rose-tree'), an ericaceous evergreen shrub with tough glossy leaves; handsome flower, slightly zygomorphic; high decorative value.

RHOMBUS, a quadrilateral figure in geometry whose sides are equal but whose angles are unequal, two being acute and two obtuse.

RHONDDA (51° 40′ N., 3° 32′ W.), parliamentary division, Glamorganshire, Wales; includes 9 ecclesiastical parishes; watered by R. river, a tributary of Taff, and by R.-Fach river, which forms E. boundary; has coal mines. Pop. 1921, 166,600.

RHONDDA (DAVID ALFRED THOMAS), 1ST VISCOUNT (1856-1918), senior partner in the firm of Thomas and Davey, coal sale agents; was M.P., 1888-1916, in latter year cr. 1st Baron; president Local Government Board, 1916-17; subsequently food controller; managing director of the Cambrian Combine and other colliery companies in S. Wales; created 1st Viscount, 1918.

RHÔNE (45° 40′ N., 4° 36′ E.), department of S. E. France, embracing old provinces of Lyonnais and Beaujolais; area, 1,077 sq. miles; traversed by river Rhône; capital, Lyons; silk industry, wines, copper, coal, manganese, iron-smelting. Pop. 1,000,000.

RHÔNE, RHONE (43° 20′ N., 4° 41′ E.), swiftest Fr. river (Rom. *Rhodamus*); rises in Swiss Alps between Furka and Grimsel mts.; flows into and through Lake of Geneva; from Geneva westwards to Lyons, then S. to Mediterranean, entering Gulf of Lyons through delta known as La Camargue; chief tributaries, Ain, Saône, Ardèche, Gard, Arve, Isére, Drôme, Durance; chief towns, Geneva, Brieg, Seyssel, Lyons, Vienne, Valence, Avignon, Tarascon, Arles; total length, 504 miles; passes through fine scenery; fierce current prevents navigation above Lyons; canals connect R. with Loire, Seine, Rhine.

RHÖNGEBIRGE (50° 30′ N., 10° E.), mountain group, N. W. Bavaria and Hesse-Nassau, Germany; highest peak the Wasserkuppe, 3,115 ft.

RHUBARB, any one of several plants of the genus *Rheum*, the *R. Rhaponticum* and *R. undulatum* being grown extensively in the United States, Britain, and other temperate countries; their leaf-like stalks, boiled with sugar, being a favorite article of food. The *R. officinale* and *R. palmatum* are grown chiefly in northern China, but also to a small extent in Europe, their roots being dried and employed as a drug, used, in small doses, from ½ to 2 grs., as an astringent tonic, and in larger doses, 15 to 30 grs., as a purgative.

RHYME, the recurrence of similar sounds at intervals not too great to be perceived by the ear. Rhyme as a poetical device was not used by the ancients. Only when the quantitative system had grown corrupt in mediæval times did rhyme come into prominence. Rhyme usually denotes a correspondence in the final syllables of words at the ends of lines, and in English the vowel sounds and following consonantal sounds of a perfect rhyme must be the same, but the preceding consonantal sound must be different (*e.g*), love, dove; crew, true.

RHYMER, THOMAS. See THOMAS THE RHYMER.

RHYMNEY (51° 45′ N., 3° 16′ W.), town, Monmouthshire, England; ironworks; collieries. Pop. 12,000.

RHYNCHOPHOROUS BEETLES, RHYNCHOPHORA, a sub-order of Beetles with head prolonged into a snout or rostrum. Those most familiar are the Weevils (*Curculionidae*), the 20,000 species of which occur all over the world. Both larvæ and adults are vegetarian, but many are exceedingly destructive to plants.

RHYOLITE, LIPARITE OR QUARTZ-TRACHYTE, group of volcanic rocks, widely distributed and resembling granite in chemical composition; highly acidic; occurs mostly in lava flows, especially in Lipari Islands (whence name *Liparite*); with exception of dacites the only lavas containing free primary quartz.

RHYS, SIR JOHN (1840-1915), Welsh philologist; first prof. of Celtic in Oxford Univ., 1877; from 1895 till his death he was principal of Jesus coll., Oxford; knighted, 1907; P.C., 1911. His works include *Lectures on Welsh Philology*, 1877; *Celtic Britain* (3rd ed.), 1904; *Studies in the Arthurian Legend*, 1891; *Celtic Folk-lore, Welsh and Manx*, 1901; *Celtic Inscriptions of France and Italy*, 1906 and 1911.

RHYTHM, a combination of movements or sounds halting and recurring at intervals on a more or less settled plan, producing that balance which is one of the main constituents of harmony. It applies to the world of motion and of sound that peculiar quality of harmonious order which in the visual world is called symmetry. Its three chief spheres are music, lit., and dancing. In all three it is notable that the modern tendency is to favor an irregular and apparently unsettled system of cadence rather than the staid and well-ordered r. of classical times.

Contrary to popular impression r. is fully as important an element in prose as it is in verse; it is more obvious in verse because it is aided by outward manifestations, but it is perhaps of even greater importance in prose, where, owing to the absence of formal restrictions, the danger of inharmonious lack of balance is all the greater. There is without doubt an unconscious use of r. as the vehicle of emotion, and it is noticeable that impassioned prose such as oratory often acquires a perfection of r. which brings it near to blank verse.

RIAZAN. See RYAZAN.

RIBBON, RIBAND, OR RIBBAND, a silk with a narrow web, varying from fractions of an inch to a foot in width, used for tying, binding, and all kinds of trimmings. A modern power loom can weave as many as forty Rs. at a time; in Jacquard looms, which turn out patterned fabrics, every warp thread is under mechanical control so that the weft or shute may be made to catch it up or not according to the design.

RIBBON FISHES AND OAR FISHES (*Trachypteridae*), long, laterally compressed, fragile, bony fishes with thin light bones and silvery skin.

RIBEIRA (42° 35′ N., 9° 5′ W.) town, province Corunna, Spain. Pop 12,500.

RIBEIRO, BERNARDIM (1482-1552), Portug. poet and sec. to the court. Disappointed in his love for his cousin, D. Joanna Zagalo, and banished from court, the poet composed his five exquisite eclogues. His chief work is *Menina e Moca*, a pastoral romance

RIBERA, GIUSEPPE (1588-1656), a leading artist of the Span. school settled in Naples, became Court painter and member of the Academy of St. Luke at Rome. The subjects of his pictures are mostly horrible and gruesome.

RIBOT, ALEXANDRE FÉLIX JOSEPH (1842-1923), Fr. statesman admitted to bar, 1864; elected member of Chamber of Deputies, 1878; minister for foreign affairs in the Freycinet cabinet of 1890; concluded alliance between France and Russia; premier 1892, 1895, 1898, and again 1917; minister of finance, 1914-17; strongly opposed policy of retaliation against religious orders, and acted as chairman of committee on secondary education; member of Fr. Academy. Wrote *Réforme de l'Enseignement secondaire*, 1900; *Discours Politiques*, 1905.

RIBS. See SKELETON.

RICARDO, DAVID (1772-1823), Eng. political economist; Jew converted to Christianity; obtained practical knowledge of economics from early life a stockbroker, when he amassed large fortune; pub. *High Price of Bullion a Proof of the Depreciation of Banknotes*, first scientific treatise on currency, 1810. He published *Principles of Political Economy and Taxation* 1817.

RICCI, MATTEO (1552-1610), Italian Catholic missionary; entered Society of Jesus, 1571, and went to East; in India 1578-82; went to China and settled with his friends in Peking.

RICCIARELLI, DANIELE (DANIELE DA VOLTERRA) (1509-66), studied under Il Sodoma and Baldasare Perrozzi. In Rome he assisted Pierino del Vaga, and forming the friendship of Michael Angelo learnt much, and was assisted by him. His principal works are his frescoes in the Trinità de Monti; 'The Massacre of the Innocents' for St. Peter's, Volterra, now in the Uffizi; 'St. Petronella,' in the Duomo of Lucca; and 'David and Goliath,' in the Louvre.

RICCIO. See RIZZIO.

RICE (*Oryza sativa*), the staple Asiatic cereal; grown in hot, damp plains, well irrigated; unhusked r. is known as *paddy*, and the areas under cultivation as 'paddy fields;' flower differs from that of most grasses in possessing six stamens. Principal rice-producing countries are: India, Japan, Siam, Madagascar, Ceylon, United States.

RICE, ALEXANDER HAMILTON (1875), an American geographer and explorer; *b.* in Boston, Mass. He graduated from the Harvard Medical School in 1898, and served two years as an interne in the Massachusetts General Hospital. He has devoted much time to exploration, mapping and scientific investigations of tropical South America, having organized and conducted five expeditions into Colombian Caqueta and Brazilian Amazons. He has contributed many articles, covering these experiences, to the Geographical Journal.

RICE, ALICE (CALDWELL) HEGAN (1870), an American author, *b.* in Shelbyville, Ky. After completing her education in private schools, she became interested in philanthropic work and was one of the founders of the Cabbage Patch Settlement House, in Louisville, Ky. In 1901 she published her first book, *Mrs. Wiggs of the Cabbage Patch*, which acquired a wide popularity, the scenes and characters being among those with which she had grown familiar through her settlement work. Among her other works are *Lovey Mary*, 1903; *Sandy*, 1905; *A Romance of Billy Goat Hill*, 1912, and *Quin*, 1921.

RICE, CALE YOUNG (1872), an American poet and dramatist, *b.* in Dixon, Ky. He graduated from Harvard University in 1895, and immediately began to write. Among his works are *From Dusk to Dusk*, 1898; *Trails Sunward*, 1917; *Shadowy Thresholds*, 1919, and *Sea Poems*, 1921. Among his plays are *Charles di Tocca* (a poetic drama), 1903; *A Night in Avignon*, 1907, and *Collected Plays and Poems*, 1915.

RICE, JAMES (1843-82), Eng. novelist; collaborated with Sir Walter Besant.

RICE, JOSEPH J. (1871), a bishop; *b.* at Leicester, Mass. He was educated at Holy Cross College, Worcester, Laval University, Montreal, Canada, and at Rome, Italy. He was ordained a priest, September 29, 1894, and was consecrated bishop of Burlington, April 14, 1910.

RICE, (WILLIAM) NORTH (1845), an American geologist; *b.* in Marblehead, Mass. He graduated from the Wesleyan University (Conn.), and the Sheffield Scientific School (Yale University), from the latter in 1867, and since then has been continuously on the faculty of Wesleyan University, being professor emeritus since 1918. He is the author of *The Geology of Bermuda*, 1884; *Science Teaching in the Schools*, 1889; *A Manual of the Geology of Connecticut*, 1906; *Through Darkness to Dawn*, 1917, and *Poet of Science, and Other Addresses*, 1919.

RICE BUNTING, BOB O' LINK, BOBLINK, BOB-LINCOLN (*Dolichonyx oryzivora*), N. American relative of the Buntings—a favorite singer, and an esteemed article of food.

RICE INSTITUTE, a co-educational institution founded in 1912, in Houston, Tex., with a fund of $10,000,000 left by the late William Marsh Rice. It has the regular collegiate courses, and in addition thereto courses in electrical, chemical and mechanical engineering and architecture. The faculty numbers about 50 and the student body 650.

RICE-PAPER is made from the pith of *Aralia papyrifera*, a tree which grows in the island of Formosa. The paper is much used in China and Japan for brightly-colored pictures and designs. It is also employed in making artificial flowers. A paper has been prepared by the Japanese from rice straw.

RICH, EDMUND. See EDMUND, SAINT.

RICH, PENELOPE, LADY (*c.* 1562-1607), *dau.* of Walter Devereux, Earl of Essex; famous as the Stella of Sidney's *Astrophel and Stella*.

RICH, RICHARD, 1ST BARON (*c.* 1500-67), Eng. Lord Chancellor, 1547-51; Attorney-General of Wales, 1532; Speaker, 1536. VIII.'s tool in persecution of More and Fisher, and suppression of monasteries.

RICHARD I., CŒUR-DE-LION, (1157-99), king of England; third s. of

Henry II.; Duke of Aquitaine, 1168; succ. to Eng. throne, 1189; raised money for Crusade; prominent in capture of Acre, 1191; defeated Saladin at *Arsuf*, 1191; on way home, captured and imprisoned by Leopold of Austria; handed over to Emperor Henry VI., who released him for ransom; on return to England, 1194, crushed *bro.* John's intrigues against him; subsequently returned to Fr. dominions; killed during siege of castle of Châlus.

RICHARD II. (1367-1400), king of England; *s.* of Black Prince; succ., 1377; met rebels under Wat Tyler at Mile End and Smithfield, 1381, and ended their insurrection; deprived of absolute power by Lords Appellant under Gloucester, 1388; concluded peace with France, 1396; revenged himself on Lords Appellant, 1397-98, sentencing them to death or exile; captured and deposed by cousin, Henry of Bolingbroke (afterwards Henry IV.), 1399; subsequently imprisoned in Pontefract Castle.

RICHARD III. (1452-85), king of England; *s.* of Richard, Duke of York; distinguished at battles of *Barnet* and *Tewkesbury*; crowned, 1483; shortly afterwards his nephews, Edward V. and his *bro.* were murdered in Tower, by his orders; suppressed Buckingham's insurrection, which ensued; defeated and killed at *Bosworth* by Henry of Richmond (afterwards Henry VII.), 1485.

RICHARD, FRANÇOIS MARIE BENJAMIN (1819-1908), abp. of Paris, 1886; cardinal, 1889.

RICHARD OF CIRENCESTER (*c.* 1335-1401), Eng. monk and historian; wrote *Speculum Historiale de Gestis Regum Angliae, 447-1066* (Rolls Ser.), of little value; forgery, *De situ Britanniae*, for long accepted.

RICHARDS, GEORGE (1872), U. S. M. C. officer; *b.* at Ironton, Ohio; *s.* of Samuel and Laura Ann Westlake Richards. He graduated from the United States Naval Academy, full course, 1893, and from School of Application, U. S. Marine Corps, 1894. After serving on various duties and stations, including Spanish American War, Philippine Islands and Boxer Rebellion, he became paymaster of U. S. Marine Corps in 1916 with rank of brig. gen.

RICHARDS, JOSEPH WILLIAM (1864-1921), an American metallurgist; *b.* in Oldbury, England. He came to this country early in life and received his education here. In 1887 he became a member of the faculty of Lehigh University, becoming professor of Metallurgy there after 1903. His works on metallurgy were ranked among the foremost authoritative works on the subject.

RICHARDS, LAURA ELIZABETH (1850), an American author; *b.* in Boston Mass., the *d.* of Dr. Samuel Gridley and Julia (Ward) Howe. Among her books are *Sketches and Scraps*, 1881; *Letters and Journals of Samuel Gridley Howe* 1906; *The Wooing of Calvin Parks* 1908; *The Little Master*, 1913; *The Life of Julia Ward Howe*, 1916 *To Arms* (war songs), 1917; *A Life of Joan of Arc*, 1919, and *In Blessed Cyrus*, 1921.

RICHARDS, ROBERT HALLOWELL (1844), an American metallurgist; *b.* at Gardiner, Me.; *s.* of Francis and Ann Hallowell Gardiner Richards. He graduated from the Massachusetts Inst Tech. in 1868, where he remained as an assistant in chemistry, and later was professor of mineralogy, assaying, etc including professor of mining engineering and metallurgy from 1884-1914 after which he became meritus professor of mining engineering at that institution. He also made several inventions among which were three ore separators for the Western United States, 1906 07-08, and was the author of *Ore Dressing*, vols. 1 and 2, 1903; vols. 3 and 4 1909, and *Ore Dressing* (text book) 1909.

RICHARDS, THEODORE WILLIAM (1868), an American chemist; *b.* in Germantown, Pa. He graduated from Harvard University, in 1886, then studied in Germany, after which he taught in the Gibbs Memorial Laboratory of Harvard University, of which he has been director since 1912. In 1907 he was exchange professor from Harvard to Berlin. In 1915 he was awarded the Nobel laureate in chemistry. With the help of assistants he has revised the atomic weights of oxygen, copper barium and a great number of other metals.

RICHARDS, WILLIAM TROST (1833-1905), an American artist; *b.* in Philadelphia, Pa. He studied painting under Paul Weber, and in Paris, finally establishing his studio in Philadelphia in 1857. His work consists largely of marine landscapes, which are especially remarkable; the action of waves shown in both storm and calm. A series of his marines in water colors are hung in the Metropolitan Museum of Art, in New York City.

RICHARDSON, ANNA STEESE (1865), an American writer; *b.* at Massillon, Stark co. Ohio; *dau.* of Samuel

and Sallie F. Wood Sausser. She was educated at the Philadelphia Normal School for Girls. Married William M. Richardson, of Becket, Mass., in 1886. After being a reporter for the Council Bluffs (La.) Nonpareil, and later for the Omaha Daily News, she was connected with the McClure Newspaper Syndicate from 1900 until 1903 and was then on the staff of the New York World until 1905 after which she was with the Woman's Home Companion. Author, *For the Girl Who Earns Her Living*, 1909; *Better Babies and Their Care*, 1914; *Adventures in Thrift*, 1916; *Why Not Marry?*, 1917.

RICHARDSON, SIR JOHN (1787-1865), Scot. zoologist, associated with Franklin and Parry in their arctic expeditions.

RICHARDSON, HENRY HOBSON (1838-86), an American architect; *b.* in the Parish of St. James, La. He graduated from Harvard University in 1859, and studied in the Ecole des Beaux Arts, in Paris, after which he returned to the United States and settled in Boston. Among the buildings he has planned are Trinity Church and the First Baptist Church (formerly the Brattle Street Church) in Boston, the municipal buildings in Pittsburgh, Pa., the City Hall in Albany, N. Y., and the Harvard Law School.

RICHARDSON, NORVAL (1877), an American diplomat and author; *b.* at Vicksburg, Miss., *s.* of Lee and Louise French Richardson. He was educated at Lawrenceville (N. J.) School and at Northwestern Presbyterian University. He was 2d secretary American Legation at Havana, Cuba, from 1909-11, at Copenhagen, Denmark, 1911-13, became 2d secretary American Embassy at Rome in 1913 and was secretary to same from 1916-20. He was then secretary to American Embassy, Santiago, Chile, from March-November, 1920, after which he was appointed same at Lisbon. In addition to contributions to magazines he was the author of *The Heart of Hope*, 1905; *The Honey Pot*, 1912; *The World Shut Out*, 1919; *Pagan Fire*, 1920, and others.

RICHARDSON, ROLAND GEORGE DWIGHT (1878), a mathematician; *b.* at Dartmouth, N. S.; *s.* of George Josiah and Rebecca Newcomb Richardson. He was educated at Arcadia College, N. S., Yale U. and at the University of Gottingen, Germany. He began teaching in Margaretsville (N. S.) School in 1895 and later was principal of the Westport (N. S.) High School from 1899-1902. In 1904 he became an instructor in mathematics at Yale University but left three years later to become assistant professor of mathematics at Brown University where he was professor of same and head of the department after 1915.

RICHARDSON, SAMUEL (1689-1761), Eng. novelist; *b.* Derbyshire; *s.* of joiner; after successful apprenticeship, entered into business, became printer of House of Commons Journals, and King's Printer; was made master of the Stationers' Company. R. began to write novels when advanced in years; he had gained some reputation as a writer of letters, and was approached with a view to publishing a 'model' letter-writer; this he did, 1741, but his first novel, *Pamela*, suggested by the other idea, was published some months before (1740).

Pamela was followed by *Clarissa Harlowe*, a somewhat tedious seven-vol. novel, written in 1744-48, and *History of Charles Grandison*, 1753.

R.'s chief legacy is his introduction of the analysis of human emotion into novel-writing.

RICHARDSON, WILLIAM CUMMINGS (1854), an American architect; *b.* in Concord, N. H. For two years, 1873-75, a special student in architecture at the Massachusetts Institute of Technology. Had been in practice at Boston since 1881. Among the buildings he designed are: Abbot Academy buildings, Andover, Mass., Youth's Companion Building, Carney Building, Boston, Springfield (Mass.) High School and others, including various educational buildings.

RICHELIEU, CARDINAL DE, ARMAND JEAN DU PLESSIS (1585-1642), Fr. statesman; bp. of Luçon, 1607; representative of clergy in States-General, 1614; Sec. of War and Foreign Affairs, 1616; assisted Marie de' Medici in recovery of power, 1620; cardinal, 1622; Minister of State, 1624-42. R. laid foundations of France's pre-eminence; won permanent power over king on 'Day of Dupes,' 1630; over-rode opposition of Gaston d'Orléans, *bro.* of Louis XIII., and secured supersession and exile of Marie de' Medici; made government strong by suppression of feudal nobility; captured Rochelle, 1682, and destroyed political power of Huguenots, but granted them certain amount of religious toleration; initiated policy of oppostion to Austria in Thirty Years War, and so destroyed power of France's great rival; opposed Hapsburgs in Netherlands and Piedmont, and aided revolt of Catalonia against Spain; patron of letters (founded *Academie francaise*).

RICHELIEU, DUC DE, ARMAND-EMMANUEL-SOPHIE-SEPTEMANIE DU PLEISSIS (1766-1822), Fr. statesman; grandson of the great R.; volunteer in Russ. army, 1790; Foreign Minister of France after Restoration, procured speedy evacuation by allies; failed to carry through electoral reform and new Concordat.

RICHEPIN, JEAN (1849), Fr. poet, romancer, conférencier, dramatist; member of Fr. Academy; has produced literary work of remarkable brilliance and unconventionality with a tendency towards morbidity in his earlier writings—(*e.g.*) *La Chanson des Gueux*, 1876, which led to his imprisonment for 'outrage aux mœurs.' Other works include *Les Caresses*, 1877; *Les Blasphemes*, 1884, and such novels as *Les Morts Bizarres*, 1876; *La Glu*, 1881, and *Le Pave*, 1883; *La Belle-au-bois-dormant*, 1907; *La Route d'Emeraude*, 1908; *Le Tango*, 1913; *Macbeth*, 1914. In 1920 he pub. *L'Ame americaine a travers quelques-uns de ses interpretes.*

RICHMOND, a city of California, in Contra Costa co. It is on the Atchison, Topeka and Santa Fe, and the Southern Pacific railroads, and on the west side of San Francisco Bay. It has a frontage of 6 miles of deep water which forms an excellent harbor. It has a large commerce. Richmond is the center of the oil region of the Pacific coast, and is the terminus of the Standard Oil pipe lines. It has large oil refineries, railroad repair shops, pipe and steel works, porcelain factories, brick works, foundries, stone quarries, etc. There is a library, city hall and several parks. Pop. 1920, 16,843.

RICHMOND, a city of Indiana, in Wayne co., of which it is the county seat. It is on the Chesapeake and Ohio, the Grand Rapids and Indiana, the Pittsburgh, Cincinnati, Chicago and St. Louis, and other railroads, and on the White Water river. It is an important industrial city and has manufactures of flour and lumber, clothing, paper bags, paper, pianos, tiles, automobiles, office furniture, church furniture, boilers, steam engines, bicycles, ploughs, threshing machines, etc. It is the seat of Earlham College and a Friends' Academy. Here also is held the yearly meeting of the Orthodox Friends of Indiana. The city was founded by a colony of Friends in 1815. Pop. 1920, 26,765.

RICHMOND, a city of Kentucky, in Madison co. It is chiefly notable for being the scene of one of the fiercest battles of the Civil War. Here the Confederate General Kirby Smith, with 18,000 troops attacked a much larger Union Army commanded by Generals Manson and Nelson, and after a three hours' battle the Union forces were defeated with a total loss of over 5,000. The town is the seat of the Central University and Madison Female Institute. Pop. 1920, 5,622.

RICHMOND, a city of Virginia, the capital of the state and the county seat of Henrico co. It is on the Southern, the Richmond, Fredericksburg and Potomac, the Atlantic Coast Line, the Chesapeake and Ohio, the Seaboard Air Line, and other railroads, and on the James River, about 127 miles from the ocean. The river is navigable for large vessels and the city has steamship connection with New York, Philadelphia, Norfolk and other Atlantic ports. Richmond is an attractive city built on seven hills and surrounded by picturesque scenery. In recent years it has come to be an important manufacturing city with over 600 industrial establishments. These industries include tobacco, iron and paper manufacturing, printing and publishing, and flour mills. The Federal Reserve Bank has a branch here. The total area of the city is about 26 square miles. The streets are well laid out and the principal streets are paved. There are many public institutions, including a medical college, theological seminary, a municipal mechanical training school, a women's college, Richmond College, and two colleges for colored students. The State Capitol, which stands on Shockoe Hill, and is surrounded by other administrative buildings, is a handsome imposing structure, dating from 1785. In the Central Hall are statues of Washington, Lafayette, Lee and others. During the Civil War the Senate Chamber was used as the Confederate House of Representatives. In the House of Delegates are portraits of Chatham and Jefferson. This room was the scene of the trial of Aaron Burr for high treason, in 1807, and was the meeting place of the State Secession Convention in 1861. The executive mansion of the Confederate States, which was formerly the residence of Jefferson Davis, was made into a museum containing many relics of the Civil War. Other notable buildings are the City Hall, State Library, State Peninentiary, Custom House, etc. In the schools are enrolled over 35,000 pupils. There are 42 public schools and many private and parochial schools. Richmond is said to have been first settled in 1609. A defensive work called Fort Charles was erected here as a protection against the Indians in 1644-45. The city was incorporated in 1742

and in 1779 became the capital of the State. It was chosen in June, 1861, as the capital of the Confederacy and from that time till the close of the Civil War was an objective point for a series of military campaigns for its capture. These were conducted by the Federal Generals McDowell, McClellan, Burnside, Hooker, Meade, and Grant. The city was defended by a strong series of fortifications. During the last three years of the Civil War battles raged about Richmond. The remains of the fortified lines are still visible. The city was finally captured after the battle of the Wilderness and the campaigns at Petersburg and Cold Harbor in 1865. See CIVIL WAR. Pop. 1920, 171,667.

RICHMOND, city, Victoria, Australia; S. E. suburb of Melbourne. Pop. 40,000.

RICHMOND (51° 28′ N., 0° 18′ W.), formerly Sheen, town, Surrey, on Thames; noted for its scenery; has remains of the Royal palace of Sheen. Pop. 1921, 35,651.

RICHMOND, BOROUGH OF. See NEW YORK CITY.

RICHMOND, CHARLES ALEXANDER (1862), an American university chancellor; *b.* in New York City. He graduated from Princeton University, in 1883, studied theology and was ordained a Presbyterian minister, in 1888. During 1894-1909 he was pastor of the Madison Ave. Church, in Albany, N. Y., after which he became chancellor of Union University, a position he has held ever since. He is the author of *The Four Winds*, 1902, and several books of poetry.

RICHMOND, CHARLES WALLACE (1868), an American ornithologist; *b.* at Kenosha, Wis.; *s.* of Edward Leslie and Josephine E. Henry Richmond. He was educated at Kenosha, Wis., and at Washington, and later was a student at Corcoran Scientific School. He made natural history explorations in Central America in 1892 and two years later became assistant curator of the division of birds at the United States National Museum, of which he was associate curator of same after 1918. He was the author of numerous papers on ornithology in *Proceedings U. S. Nat. Museum*, *The Auk*, etc.

RICHMOND, GRACE S., an American author; *b.* in Pawtucket, R. R. After a private education she began writing. Among her books are *The Indifference of Juliet*, 1905; *A Court of Inquiry*, 1909; *Under the Country Sky*, 1916; *The Brown Study*, 1917, and *Red and Black*, 1919.

RICHMOND AND LENNOX, DUCHESS OF, FRANCES TERESA STEWART (1648-1712), Eng. court beauty; maid of honor; *m.* 5th Duke of R., 1667; attack of small-pox, 1668, spoiled her appearance.

RICHMOND COLLEGE, an educational institution founded by the Baptist Church in 1832, in Richmond, Va., as the Virginia Baptist Seminary, the present name being adopted in 1840. It was opened to women in 1898, but in 1914 the Westhampton College, especially for women, was opened, the two institutions being co-ordinated under one administration, having the same male faculty and president. In the fall of 1921 the faculty numbered 35 and the student enrollment amounted to 750. The group system of elective studies has been adopted, there being three groups.

RICHTER, EUGENE (1839-1906), Ger. politician; liberal and free-trader of old-fashioned type; opposed to Socialism; one of first *Freisinnige*; founder, 1885, and editor of *Freisinnige Zeitung*.

RICHTER, GUSTAV (1823-84), a German artist, especially known for his portrait painting.

RICHTER, HANS (1843-1916), Hungarian musician; conductor at Bayreuth festivals since 1876, of Birmingham festivals, 1885-1909, of Hallé concerts, Manchester, 1900 on.

RICHTER, JOHANN PAUL FRIEDRICH, JEAN PAUL (1763-1825), celebrated Ger. novelist and humorist; *b.* Wunsiedel, Bavaria; studied, Leipzig, 1781-84; best works, *Die unsichtbare Loge*, *Hesperus oder 45 Hundsposttage*, *Flegeljahre* (novels); *Leben Fibels, Doktor Katzenbergers Badereise* (humoristic works); *Levana oder Erziehungslehre* (educational treatise).

RICHTHOFEN, BARON VON (*d.* 1918), most famous of German airmen; appointed commander of 11th Squadron and awarded Order Pour le Mérite and Red Eagle with crown and swords. Ger. communiqués announced on Feb. 15, 1917, that he had won his twentieth and twenty-first aerial victories, and on April 21, 1918, that he had gained his seventy-ninth and eightieth. At this time he was lying dead behind the Brit. lines. Wrote *Red Air Fighter*, a book of reminiscences.

RICHTHOFEN, FERDINAND, BARON VON (1833-1905), Ger. Geographer; pub. well-known geographical work, *China, Ergebnisse eigner Reisen und darauf gegrundeter Studien*, 1877-85;

prof. of Geography at Berlin, 1886-1905.

RICINA (43° 20′ N., 13° 30′ E.), ancient town, Picenum, Italy, on Potenza.

RICKENBACKER, EDWARD VERNON ('EDDIE') (1890), an American aviator; *b.* in Columbus, Ohio. As a youth he became widely known as an automobile racer and won championships at international and national meets. In June, 1917, he accompanied Gen. Pershing to France as a member of the Motor Car Staff, and shortly afterwards was transferred to the air service. He became commanding officer of the 94th Aero Pursuit Squadron, this unit being credited with 69 victories at the end of hostilities, Rickenbacker leading the list with 26 victories to his personal credit. He is the author of *The Flying Circus*, 1919.

RICKETS, RACHETIS, a constitutional disease of childhood, characterized chiefly by softening and consequent deformities of the bones. The disease is due to alteration of metabolism believed to be due to defective diet, the deficiency being in proteids and fats, but there is another opinion that it is due to a toxæmic condition of the alimentary tract. Unhealthy conditions of life and bad hygiene are contributory causes.

RICKETTS, JAMES BREWERTON (1817-1887), an American soldier; *b.* in New York City. In 1839 he graduated from the United States Military Academy and after being commissioned a lieutenant of artillery served in the Mexican War. He took part in the Battle of Bull Run and was taken prisoner. When released in 1862 he returned to duty with the rank of brigadier-general and participated in the second battle of Bull Run. Brevetted major-general in 1865 and mustered out in 1866. Retired in 1867 from the regular service with the rank of major-general.

RICHOCHET, the low firing of a gun, so that the shot bounds along the ground—a deliberate device in the XVII. and XVIII. cent's.

RICOLD OF MONTE CROCE (1242-1320), Ital. Dominican, who preached in Muslim lands.

RIDDLE, JOHN WALLACE (1864), an American diplomat, *b.* at Philadelphia, Pa.; *s.* of John Wallace and Rebecca Blair McClure Riddle. He was educated at Harvard University, Columbia Law School and at Ecole des Sciences Politiques, Paris. He was secretary to the United States Legation to Turkey, 1893-1900; secretary to the U. S. Embassy to Russia, 1901-03; diplomatic agent and consul-general to Egypt 1903-05; E.E. and M.P. to Rumania and Serbia, 1905-06; ambassador to Russia, 1906-09 and in 1921 was appointed ambassador to Argentina.

RIDDLES, very ancient form of diversion, mentioned in Homer; most famous classical instance, the Riddle of the Sphinx, answered by Œdipus; references in the Bible (*e.g.*), Samson's conundrum to the Philistines. Frequently embodied fragment of mythology. Popular in the Middle Ages, still in vogue in Russia and in the East.

RIDEAU CANAL, Ontario, Canada (44° 30′ N., 76° 20′ W.), connecting Kingston, on Lake Ontario, with Ottawa by way of Rideau R. and Lake Rideau thence N. to Ottawa R., which it joins below Chaudière Falls; established for military purposes, 1826-34; since construction of railways importance has declined; length, 126¼ m.; locks, 47; navigable depth, 4½ ft.

RIDEING, WILLIAM HENRY (1853-1919), an Anglo-American editor; *b.* in Liverpool, England. Coming to this country as a youth, he entered journalism, and after 1882 was assistant editor of the Youth's Companion. During 1887-99 he was associate and managing editor of the North American Review. Among his works are *The Scenery of Pacific Railways*, 1878; *How Tyson Came Home*, 1904; and *Many Celebrities*, 1912, the latter being a volume of reminiscences.

RIDGE, WILLIAM PETT, Eng. author; commenced to write in 1890. His books include *A Clever Wife, Mor'em'ly, London Only, Lost Property.*

RIDGEFIELD, a city of New Jersey. Pop. 1920, 8,575.

RIDGEWAY, ROBERT (1850), an American ornithologist, *b.* at Carmel, Ill., *s.* of David and Henrietta Jane Reed Ridgeway. He was educated at Indiana University. He was zoologist of the United States Geological Exploration of the 40th parallel (under Clarence King) in California, Nevada, Southern Idaho and Utah, 1867-69, and after 1880 was curator of the division of birds of the United States National Museum. Author: *A Manual of North American Birds, Color Standards and Color Nomenclature, The Ornithology of Illinois* (3 vols.), *The Birds of North and Middle America* (8 vols. published).

RIDGEWOOD, a village of New Jersey, in Bergen co. It is on the Erie railroad and is almost entirely a residential place. It has many handsom

public and private buildings and an excellent school system. Pop. 1920, 7,540.

RIDGWAY, a borough of Pennsylvania, in Elk co., of which it is the county seat. It is on the Pennsylvania and the Buffalo, Rochester and Pittsburgh railroads, and on the Clarion river. It is the center of an extensive lumbering region and its industries include the manufacture of leather, iron, clay, lumber products, silk goods, machine tools, etc. In the neighborhood are important deposits of coal and natural gas. There is a court-house, hospital and Y. M. C. A. building. Pop. 1920, 6,037.

RIDING, use of animals, especially horses, as means of locomotion known since earliest time; Greeks and Romans expert horsemen, rode without saddle; Numidian cavalry in great demand as mercenary troops, rode barebacked without bridle; horses never used extensively by Jews. Good horsemen ride with body above hips loose, to move with swing of horse; bridle held in left hand; both hands kept low; seat preserved by balance combined with gripping with thigh and knee; foot should be level with horse's barrel except in such forms as fox-hunting and horse-racing when stirrup-leathers must be shortened. Military horsemanship differs from ordinary.

RIDINGS (originally *thrithing*, the third part), name applied to the three districts of Yorkshire (N., E., and W.).

RIDLEY, NICHOLAS (1500-55), Eng. chaplain to Henry VIII., 1541; supported Lady Jane Grey; tried as a heretic under Mary, and burnt.

RIDPATH, JOHN CLARK (1840-1900), an American historian; *b.* in Putnam co., Ind. He graduated from De Pauw University, in 1859, and later taught at Asbury University, of which institution he became vice-president resigning in 1885. His historical writings were popularly written and widely read. Among them are *An Academic History of the United States*, 1875; *A Monograph on Alexander Hamilton*, 1880; *Great Races of Kankind*, 1892; and *Ridpath's History of the World*, 1894.

RIEGO, NUÑEZ, RAFAEL DEL (1784-1823), Span. agitator; imbibed Liberal ideas while prisoner in France; made independent revolt backed by his regiment, 1820; captured and hanged.

RIEHM, EDUARD KARL AUGUST (1830-88), Ger. Old Testament scholar; prof. at Heidelberg, 1861, Halle, 1862.

RIEL, LOUIS (1844-85), Canadian rebel; led discontented Métis; headed insurrections in Manitoba region, 1869, 1885; betrayed and executed.

RIEMANN, GEORG FRIEDRICH BERNHARD (1826-66), Ger. mathematical physicist; studied at Göttingen, 1846, and Berlin, 1847-50, under Dirichlet and Jacobi; wrote thesis on theory of functions of a complex variable, 1851.

RIENZI, COLA DI, RIENZO (*c.* 1313-54), Rom. tribune; friend of Petrarch, and one of precursors of Renaissance in that he strove to restore glories of ancient Rome; raised the people, who proclaimed him tribune, 1347, and established republic; several Ital. towns joined, but R. alienated supporters by extortions, and in few months was forced to fly; again obtained power, 1354, but was murdered.

RIESA (51° 20′ N., 13° 18′ E.), town on Elbe, kingdom of Saxony; sawmills; boat-building yards. Pop. 16,000.

RIESENER, JEAN HENRI (1734-1806), Fr. cabinet-maker; *b.* Gladbach; apprenticed in Paris to Oeben, whom he succeeded; married twice; divorced second wife; greatest of Louis Seize cabinet-makers; *s.* became famous portrait painter.

RIESENGEBIRGE, GIANT MOUNTAINS (50° 48′ N., 15° 35′ E.), mountain range, Germany, separating Bohemia from Pruss. Silesia and connected westward with the Erzgebirge, and eastward with the Sudetengebirge; length, 24 miles; highest point, Schneekoppe (5,260 ft.).

RIETI (42° 25′ N., 12° 53′ E.), ancient *Reate*, cathedral city, province Perugia, Italy. Pop. 10,500.

RIF, ER RIF, or **RIFF,** a mountainous strip of coast in N. Morocco, stretching from Ceuta to Algeria. There are some 1,500,000 inhabitants in the R. country.

RIFLE-BIRDS (*Ptilorthis*), genus of Birds of Paradise, found in woods in N. Australia and New Guinea.

RIFLE. At a very early period muskets were made with grooved barrels, with a twist in them to give a spin to the bullet, and thuse secure a steadier and more accurate flight. The principle was already known in archery, for the feathers of arrows were sometimes set diagonally to put spin on the arrow in its flight. There is a Swiss edict of the 16th cent. forbidding competitors at shooting matches to use 'grooved muskets' when competing with marksmen using smooth bores. By this time the

armorers of Nuremberg were making muskets with spiral grooves—(*i.e.*) rifles. But with the tools available it was a difficult business, and the globular bullet was ill adapted for the rifle. Further, with the old muzzle-loader, loading was a slow process, as the bullet had to be forced into the grooves, a hammer being sometimes used to drive it down with the ramrod. In the 18th cent. manufacturing methods were improved, and the first attempts were made to produce an elliptical or elongated bullet with a base that would expand into the grooves under the force of the explosion. This was the key to making loading more rapid. But the improvement was very slowly adopted; rifles were used only by picked corps of sharpshooters, and by hunters who could afford an expensive weapon. It was not until the middle of the 19th cent. that rifles came into general use as the infantry weapon. Their general adoption was largely the result of the Fr. inventor Minié's production of an efficient bullet, cylindrical and elongated, slightly smaller than the calibre of the rifle, but with a hollow base in which was fixed an iron cup; this, on the charge being fired, forced the lead of the base into the grooves and set the bullet rotating. The Prussians had already adopted the needle-gun, invented by Dreyse, which became their infantry weapon as early as 1841; but in other armies military conservatism long opposed the adoption of the breechloader on the ground that it would lead to reckless waste of ammunition. It was not till after advantages of the new arm had been demonstrated by the wars of 1864 and 1866 that it came into general use.

In the World War the Brit. rifle was an improved Lee-Metford, the 'Lee-Enfield.' It is a rifle of ·303 calibre, 3 ft. 8½ in. long, with the barrel cased in wood over all its length, so that when heated by firing it can be grasped anywhere. The magazine holds ten cartridges, and is reloaded by slipping in two clips of five each. The rifle is sighted up to 2,800 yds. Extreme range is about 3,700 yds.

The rifles of the chief armies at the period of the World War were: Great Britain, Lee-Enfield; France, the Lebel; Austro-Hungary, Bulgaria, Holland, Italy, and Rumania, the Mannlicher; Greece, the Mannlicher-Schönauer; Germany, Serbia, Spain, Sweden, and Turkey, the Mauser; Russia, the '3-line rifle'; Switzerland, the Schmidt-Rubin; Japan, a rifle of Jap. invention, known as the 'Year 38 Rifle'; U. S. the Springfield. All these were repeating rifles, mostly bolt action, with calibres of from ·254 to ·315, and sighted up to from 2,000 to 2,600 yards.

The tendency is now towards th introduction of automatic rifles—(*i.e.* magazine rifles which on depressing stud or pulling back and holding trigger, continue firing by self-actin breech mechanism so long as there ar cartridges in the attached magazine The automatic rifle is in fact a smalle variety of Machine Gun. See MACHIN GUN. Automatic pistols are alread largely in use. No army has yet adopte an automatic rifle as its general weapon though in the war various automati firearms were used as a special armamen in exceptional cases.

The *Morris Tube* is a small bore rifled tube inserted in a rifle barrel t enable a miniature cartridge to be use at very short ranges for training pu poses.

RIGA, seapt. and city, cap. Latvi (56° 57′ N., 24° 3′ E.), near mouth o Dvina; formerly fortified; old castle was member of Hanseatic League; ha (normally) very large import and expor trade, although the harbor is closed b ice for four months every year. Export corn, flax, hemp, timber, skins, linseed eggs; manufactures cottons, machinery glass, paper, etc.: old town preserve mediæval aspect: new town has fin boulevards and buildings. Peace nego tiations between the Poles and Russia Soviet and Ukraine governments wer transferred here from Minsk in Sept 1920, and on Oct. 12 a preliminar treaty of peace and an armistice wer signed. Pop. 569,000. See RUSSIA.

Battles for Riga.—In the World Wa the Russian retreat of 1915 brought th Germans within reach of Riga, but th Russians offered stubborn resistance o the Dvina and its trib. the Aa, whic runs into the Gulf of Riga west of th city, July, 1915. The Germans the attempted to turn the line of the Dvin from the sea. A considerable Ge squadron attempted to force the en trance to the gulf, but was beaten of Aug. 8. Ten days later the Russia Baltic Fleet gained an important vi tory. Its object having failed, the Ge squadron evacuated the gulf, Aug. 2 There followed a long land struggle fo the possession of the Dvina. The Ge mans attacked the three brigheads a Lennevaden, Friedrichstadt, and Jacob stadt, but the Russians destroyed th bridges and maintained a skilful de fense which prevented the enemy mak ing any material headway.

The Germans next gained a footin on Dahlen I., near Kekken, but wer unable to cross the river.

The situation around Riga remaine practically unchanged until the summ

after the Russian Revolution. At the end of Aug., 1917, General von Hutier, the new commander of the 7th Ger. Army, suddenly and surreptitiously crossed the Dvina about 20 m. below Riga, and reached the Riga-Dvinsk railway, Sept. 2. Surprise and wavering put an end to any plan of defense, and despite the heroic rearguard actions of some 'battalions of death,' the Russians evacuated Riga on the 3rd and the Germans entered the city, capturing great quantities of stores and material. On the establishment of the republic of Latvia in 1919, Riga became its capital.

RIGA, GULF OF, a gulf on the S. coast of the Baltic Sea, S. of the Gulf of Finland. It is 100 m. long and 60 m. broad at its widest. The greatest depth is 22 fathoms, and is frozen for about 120 days in the year. The R. Dvina flows into it past the seaport town of Riga (*q.v.*).

RIGGING, term applied to whole machinery of propulsion of a sailing ship, including mast, yards, sails, and the complexity of cordage; divided into 'standing' (fixed) and 'running' (haulable). 'Standing r.' comprises those ropes by which mast is secured and assisted against force of wind; backstays support against force from behind, breast-stays and shrouds resist lateral pressure, all combine against force from front. 'Running r.' includes movable timber (spars), sails, and the tackle necessary for their management.

There are two main types of rigging, one where sails are slung parallel with vessel (fore and aft), the other where sails are placed crosswise (square); shape of sails usually triangular in first case, rectangular in second.

RIGGS, ERNEST WILSON (1881), a college president; *b.* at Marsovan, Turkey; *s.* of Rev. Edward and Sarah Hinsdale Dwight Riggs. After graduating from Princeton University in 1904 he became United States vice-counsul at Harpoot, Turkey, in which position he remained until 1907. He then studied at the Auburn Theological Seminary and was ordained a Presbyterian minister in 1910, but did not however take charge of a congregation, instead accepting the position of president of Euphrates College, at Harpoot, the same year. He also became associate secretary of the American Board of the Near East Relief in 1921.

RIGGS, KATE DOUGLAS WIGGIN (1859-1923), an American author; *b.* in Philadelphia, Pa. She graduated from the Abbot Academy, in Andover, Mass., in 1878, and then organized the first free kindergartens on the Pacific Coast for poor people, in which work she has ever since been interested. Her works have acquired a wide popularity. Among them are *The Story of the Patsy*, 1889; *A Cathedral Courtship*, 1893; *Penelope's Progress*, 1898; *Penelope's Experiences in Ireland*, 1901; *Mother Carey's Chickens*, 1911, and *The Story of Waitstill Baxter*, 1913.

RIGHT-HANDEDNESS. In the fights of primitive man the decisive blow was no doubt often one delivered over the heart or over the cardiac plexus. The most efficient protection against such a blow is the interposed left arm, either with or without a shield. But the employment of the left arm for protective purposes necessitates the use of the right arm for attack. Thus in two ways the predominance of the right hand and arm arose. It is difficult at the present time to estimate the share of heredity and that of education in the subsequent production of right-handedness. Left-handedness is to a great extent hereditary. The ability to use right and left hands with equal facility is named *ambidexterity*.

RIGHT OF WAY is either public or private. Public rights of way are enjoyed by every member of the public, and are acquired by dedication or presumption of dedication arising from user. Private rights of way are easements, enjoyed in connection with a particular house by a particular person.

RIGHTS OF MAN. A declaration passed by the French National Assembly on August, 1789. It was attacked by Edmund Burke and a vigorous reply was made to him by Thomas Paine in his Rights of Man.

RIGHT-WHALE (*Balaena*), a genus of whales, characterized by the large head and mouth, long plates of whalebone being attached to the palate, and by the absence of the dorsal fin. The Greenland or R. (*B. mysticetus*) is the best-known Cetacean, and was long supposed to be of world-wide distribution. Other species have, however, been identified, including the Southern or Cape whale (*B. australis*).

RIGI, OR RIGHI, a mountain of Switzerland, rising between the Lakes of Lucerne and Zug. Altitude, 5,906 ft. Its popularity with tourists is due to the fine view it commands. The summit may be reached by a railway from Vitznau on the S., or by one from Arth on the E.

RIGORISM, term used of any ethical theory (such as those of the Stoics and

of Kant) which is ascetic in type and finds the moral value of conduct rather in self-control and obedience to law than in conduciveness to happiness.

RIGOR MORTIS, rigidity in a dead body due to coagulation of contents of muscle fibres (muscle plasma). Generally affects whole body in from 12 to 18 hours after death, and passes off in about 36 hours. First appears in neck and face, and thence gradually extends downwards.

RIG-VEDA. See BRAHMANISM.

RIHBANY, ABRAHAM MITRIE (1869), a clergyman; *b.* at El-Shiweir, Lebanon, Syria; *s.* of Mitrie and Marsha Mutter Rihbany. He was educated at the American Boarding School, at Suk El Gharb, Lebanon. He came to the United States in 1891, and studied at Ohio Wesleyan University, 1895-96, after which he began preaching in the Congregational Church, at Morenci, Mich. He was ordained a Unitarian minister in 1900 and was pastor of First Church, Toledo, Ohio, from 1901-11, after which he was pastor of the Church of the Disciples (Unitarian), Boston. He was a lecturer on contrasts and harmonies between Eastern and Western Civilizations, and was the author of several books, including, *The Hidden Treasure of Rasmola*, 1920.

RIIS, JACOB AUGUSTUS (1849-1914), a Danish-American journalist and social reformer; *b.* in Ribe-Denmark. He came to the United States in 1869, followed numerous vocations for a while, eventually becoming a member of the reportorial staff of the New York Sun. It was in this capacity that he became acquainted with the slums of New York, and began devoting himself to a continuous warfare against slum conditions, which he did largely through publicity. He became very friendly with Theodore Roosevelt, while the latter was Police Commissioner of New York and had his co-operation. In 1897 he was secretary of the Small Parks Commission, the only public office he ever held. He wrote *How the Other Half Lives*, 1890; *The Making of an American*, 1901, and *Life Stories of the Other Half*, 1914.

RILEY, JAMES WHITCOMB (1853-1916), an American poet; *b.* in Greenfield, Ind. After finishing his public school education he took up the trade of an itinerant sign painter, and for ten years earned a precarious living wandering over the Middle West, painting signs and even houses and barns. At the end of that period he took up newspaper work in Anderson, Ind., and while doing regular reporting occasionally published bits of verse. As a hoax he wrote a poem in imitation of the style of Edgar Allen Poe and he and the editor of the paper published it as a discovered M.S. For a while even many experts were deceived, but when finally the trick was uncovered, Riley lost his job on the paper and for a time had to return to sign painting. Eventually the Indianapolis Journal took him on its staff, and thenceforward his verse appeared frequently in that paper. Most of it was written in the Hoosier dialect of Indiana, and quickly took the popular fancy. The first collection in book form appeared in 1883, under the title *The Old Swimmin' Hole, an' 'Leven More Poems.'* It sold in vast quantities and made Riley immediately famous. He probably comes nearer to being the national American poet than any other. In 1915 Indiana and New York both celebrated his birthday as 'Riley Day.' Among his other works are *An Old Sweetheart of Mine*, 1902; *Riley's Songs o' Cheer*, 1905, and *Old Times*, 1915.

RIMBAUD, JEAN ARTHUR (1854-91), Fr. poet; after producing marvelous 'Symbolist' poems between ages of 17 and 19, and enjoying friendship (which turned to enmity) of Verlaine and other chief contemporary poets, vanished from Europe; his poems appeared as *Les Illuminations*, 1886.

RIMINI (44° 3′ N., 12° 33′ E.), town, Forli, Italy; there are many remains of the ancient city of Ariminum, which, after belonging to the Umbrians and Etruscans, was taken by the Romans in 286 B. C., and at a later date was a bone of contention between Goths and Byzantines; after passing through the hands of Byzantines, Lombards, and Franks, it came in 1237 to the possession of Malatesta family, by whom it was sold to Venice in 1503; seized by pope in 1528, remaining a papal possession until 1860. Rom. remains include triumphal arch erected to Augustus, five-arch marble bridge, and parts of the old walls. The principal industries are shipbuilding, fisheries, and the manufacture of matches, furniture, and silk. Pop. (commune) 48,000.

RIMSKY-KORSAKOV, NIKOLAS ANDREIEVITCH (1844-1908), Russ. composer; wrote operas, symphonies, and songs.

RINDERPEST, OR CATTLE PLAGUE, infectious disease affecting cattle, sheep, goats, camels, deer, and similar animals; endemic in Central and S. Asia; introduced into S. Africa towards end of 19th cent.; only occurring in W. Europe from time to time by infection through imported cattle or hides.

The disease is believed to be caused by a bacterium, but the infective agent has not yet been isolated, although it is known to exist in the excretions, and in the blood, flesh, organs and their secretions, of the affected animal. The chief protection against the disease is by the prohibition of the importation of cattle from infected countries, while inoculation methods, either of bile or of blood serum from affected animals, have had some success in giving protection against attacks.

RINEHART, MARY ROBERTS, an American author; *b.* in Pittsburgh, Pa. After a public high school education she entered and graduated from the Pittsburgh Training School for Nurses. Her novels have acquired a wide popularity. Among them are *The Circular Staircase*, 1908; *The Man in Lower Ten*, 1909; *The Window at the White Cat*, 1910; *The Amazing Adventures of Letitia Carberry*, 1911; *Long Live the King*, 1917; *The Breaking Point*, etc. She has also written a number of plays, among these being *Spanish Love* and *The Bat*, both produced in 1920.

RINEHART, WILLIAM HENRY (1825-74), an American sculptor; *b.* in Carroll co., Md. As a youth he apprenticed himself to a marble cutter in Baltimore, and for ten years worked at that trade. At the end of that period he made a trip to Italy, where he remained two years, studying sculpture. On his return he began executing the works, the most notable of which are the foundations for the Post-Office Building in Washington, D. C., two reliefs, *Night* and *Morning*, and he finished the bronze doors of the National Capitol, begun by Crawford.

RING, ornament for fingers or ears; also used by savages for various other parts of body. R's have been worn from earliest times, most ancient being those found in Egyptian tombs. They may be made of gold, silver, or precious metal, and may carry precious stones.

It is supposed that r's owe their origin to the cylindrical seals of early times. These developed from small stones to signet rings, or rings with engraved seals, used by their owners for giving their authority to documents, etc. Episcopal r's are given to bishops on consecration; bethrothal and wedding r's are given as pledges, and were used in this way by the Jews before the Christian era. Posy r's had rhymes engraved on the inside of the hoop, and were common in XVI.-XVII. cent's. See also EAR-RING.

RINGWORM, disease usually affecting the scalp, caused by a fungus which grows on the hairs, characterized by the development of a bald spot which is scaly and has broken hairs upon it. The treatment is to apply X-rays to the affected spot, which remove the hairs, or paint it with formalin, which kills the fungus.

RIO CUARTO (34° S., 64° 39′ W.), town, on Rio Cuarto, Cordoba, Argentina. Pop. 16,000.

RIO DE CONTAS (13° 17′ S., 42° 34′ W.), town, Bahia, Brazil. Pop. 18,000.

RIO DE JANEIRO (22° 57′ S., 43° 7′ W.), capital, Brazil, beautifully situated on east coast, on inlet of same name; archiepiscopal see, but no cathedral. Public buildings include the old city palace, formerly viceregal residence, and the museum, formerly imperial palace, national library, observatory, arsenal, exchange, palace of justice, and various ministerial offices. There are numerous philanthropic institutions, one or two educational establishments, fine parks, and botanical gardens The climate is hot and unhealthy.

R. was discovered by Portug. explorers early in XVI. cent.; French settled here in 1555, but were subsequently expelled by Portuguese; taken by French for short time in 1711; became capital of Brazil, 1763; scene of rising in 1831, which led to abdication of Pedro I. In 1875 several large banks failed; and here occurred the revolution of 1889, when Brazil was proclaimed a republic, and rising of 1893, when town was damaged by bombardment.

The harbor is one of the finest in the world, and the commercial importance of the city is very great, half the imports and exports of Brazil passing through it; exports coffee, gold, manganese ore, hides, tobacco, diamonds, rubber, etc. Pop. 1920, 1,157,873.

RIO DE JANEIRO (22° 57′ S., 43° 7° W.), maritime state, Brazil, drained by Parahyba; interior is mountainous; chief product, coffee. Pop. 1,501,969. Capital, Nictheroy.

RIO DE ORO (23° 30′ N., 16° W.), Span. possession, W. Africa, extending along Atlantic coast between Capes Bojador and Blanco, and forming part of W. Sahara; area, 71,000 sq. miles; administered under the control of the governor of the Canary Islands. Pop. 13,000.

RIO GRANDE DEL NORTE (35° N., 106° 40′ W.), river, N. America, rises in San Juan mountains, Colorado, and flowing S. E., forms boundary be-

tween Mexico and Texas; falls into Gulf of Mexico; length, 2,000 miles.

RIO GRANDE DO NORTE. An Atlantic state of Brazil in the N. E., with an area of 22,200 sq. m. and a pop. of 552,071. Cap. Natal. Cochineal, cinchona, coffee, cotton, tobacco, rubber are produced, and horses and cattle are reared.

RIO GRANDE DO SUL (21° 47′ S., 40° 52′ W.), most southerly state, Brazil, lying between Atlantic and Uruguay R.; area, 91,333 sq. miles; plateau in N., grass-covered plains in S. Colonized by Jesuits in XVII cent., R. G. came under Portug. control 1750; rebellion occurred, 1835-45; became state of Brazilian Republic after revolution of 1889. Soil is fertile; pastures of S. and S. W. given up to rearing of cattle, horses, and sheep, the principal exports being hides, horse-hair, bones, tallow, and preserved meat. Cereals, vegetables, fruit, coffee, and sugar-cane are grown. Minerals include coal, gold, lead. Chief towns are Porte Allegre and Rio Grande do Sul. Pop. 2,138,831; (town) 20,000.

RIO GRANDE DO SUL (32° 7′ S., 52° 18′ W.), city seaport, state Rio Grande Do Sul, Brazil; exports dried meats, hides. Pop. 22,000.

RIOJA, LA (25° 25′ S., 67° W.), province, N. W. Argentina. Pop. 89,000. Capital, Rioja. Pop. 6,500.

RIOM (45° 54′ N., 3° 8′ E.) (ancient *Ricomagus*), town, Puy-du-Dôme, France, formerly capital of Auvergne. Pop. 10,700.

RIO NEGRO (40° S., 64° W.), (1) territory, E. part of Argentina. Pop. 30,000. Capital, Viedma, on Rio Negro; (2) river, rises as Guainia, Colombia, S. America, tributary of Amazon; length *c.* 1,400 miles.

RIO PARDO (29° 58′ S., 52° 30′ W.), town, Rio Grande do Sul, Brazil, at junction of Rio Pardo and Jacuhy. Pop. 4,000.

RIOT, a tumultuous disturbance of the peace by three or more persons assembling on their own authority, with the intent to assist one another mutually against any who shall oppose them in some enterprise of a private nature; also the carrying out of this enterprise in a violent and turbulent manner to the terror of the people—whether the act intended were of itself lawful or unlawful.

RIO TEODORE, OR RIO THEODORE, also known as the River of Doubt, in Brazil, State of Matto Grosso. It is a tributary of the Rio Madero and flows northward, nearly 1,000 miles i length. Theodore Roosevelt parti explored this river in 1914 and its nam was changed in his honor.

RIO TINTO (37° 46′ N., 6° 38′ W. town, Huelva, Spain; copper mine Pop. 11,300.

RIOUW, RHIO (0° 59′ N., 104° 2 E.), archipelago, Dutch East Indies, of Malay Peninsula. Pop. 115,000.

RIPLEY (53° 3′ N., 1° 25′ W.), tow Derbyshire; collieries; silk-mills. Po 12,000.

RIPLEY, GEORGE (1802-80), a American social reformer; *b.* in Green field, Mass. He graduated from Ha vard University in 1823, studied theolog and became a Unitarian minister, 1826. The works of Fourier especiall aroused his interest at this time, an he was the prime mover in the estal lishment of Brook Farm, in 1841, communistic experiment in which som of the leading literary and profession people of New England participate After the failure of the experime Ripley went to New York, where became literary editor of the Tribun He wrote *Discourses on the Philosop of Religion*, 1839.

RIPLEY, WILLIAM ZEBINA (1867 an American economist; *b.* in Medfor Mass. He graduated from the Mass chusetts Institute of Technology, 1890, where he was professor of ec nomics during 1895-1901, after which was professor of political economy Harvard University. He is the author *The Financial History of Virgini* 1890; *Trusts, Pools and Corporation* 1905; *Railway Problems*, 1907; *Ra roads*; *Rates and Regulation*, 1912, a *A Special Report to the U. S. Eight Ho Commission on Trainmen's Schedules a Agreements*, 1917.

RIPON (54° 8′ N., 1° 31′ W.), tow on Ure, Yorkshire, England; episcop see, has fine cathedral (dating from X cent. and containing many interesti monuments); R's manufactures (e pecially spurs) have greatly declin in neighborhood is Studley Royal, se of Lord R., with Fountains Abbey the grounds. Pop. 1921, 8,389.

RIPON, 1ST MARQUESS O GEORGE FREDERICK SAMU ROBINSON (1827-1909), Brit Libe statesman; Viceroy of India 1880-8 Colonial Sec., 1892-95; Lord Privy Se 1905-08.

RIPON COLLEGE, a co-educatio institution, founded in 1850, in Ripo Wis., as Brockway College, its prese name being adopted in 1863. The Co

gregationalists assisted largely in financing it, but at the present time it is entirely non-denominational. It has a college department, a preparatory department, normal courses and gives courses in music and art, the group system being in effect. The library has over 20,000 volumes. In 1921-22 it had a student body numbering 423 and a faculty of 33.

RIPPERDA, DUKE OF, JOHN WILLIAM (1690-1737), Dutch minister of Philip V. of Spain; bitterly disliked by Castillian nobility; concluded treaty with Austria, 1725, falling into disgrace when Austria broke agreement, 1726; imprisoned for treasonable utterances; escaped; slain at *Ceuta*, fighting against Spain.

RISTITCH, JOVAN RISTICH (1831-99), Serbian Liberal statesman; responsible for wars with Turkey, 1876-78, which resulted in some gains to Serbia, but loss of Bosnia and Herzegovina; fell, 1893.

RISTORI, ADELAIDE (1822-1906), famous Ital. tragic actress; in *Studies and Memoirs* left her interpretation of her characters.

RITCHIE, ANNA CORA MOWATT (1819-70), an American actress and author. She was for many years a favorite on the American stage and wrote also several popular poems.

RITCHIE, JOHN (1853), an American scientist; *b.* at Boston, Mass.; *s.* of John and Mary White Ritchie. He was educated at English High School, Boston. He was assistant at Harvard College Observatory for 8 years and for 23 years was the official in charge of the collection and distribution of astronomical news for the United States. He had the largest private library of conchology and one of the largest collections of shells in the United States. Author (with Dr. S. C. Chandler) *Science Observer Code*, 1888.

RITSCHL, ALBRECHT (1822-89), Ger. theologian and philosopher; ed. at Halle; prof. at Bonn, 1852, Göttingen, 1864; at first influenced by Tübingen school, but rejected their standpoint.

RITSCHL, FREDERICH WILHELM (1806-76), Ger. philologist; *b.* Grossvargula, in Thuringia; prof. of Philology, Breslau, 1834; Leipzig, 1865. As a scholar his fame will always be secure on account of his great collection of Latin inscriptions, *Priscae Latinitatis Monumenta Epigraphica*, 1862.

RITTENHOUSE, DAVID (1732-96), a mathematician; *b.* at Germantown, Pa. R. was employed by the government in 1779 on a commission to fix the state boundaries between Pennsylvania and Virginia. In 1791 he succeeded Franklin as president of the Philosophical Society of Philadelphia. He made several contributions to the science of magnetism.

RITTER, KARL (1779-1859), Ger. geographer whose name is borne by geographical institutions in Berlin and Leipzig; chief work, *Geography in its Relation to Nature and the History of Men.*

RITUAL, the outward acts of worship. In common use, a *Ritualist* is a High Churchman or one who copies in the Anglican Church the ceremonial of the Roman, but this is a narrowing of the term. R. plays a prominent part in all religions. R. is historically closely allied to sacramentalism (*i.e.*), the performance of certain outward acts, and the use of symbols becomes a supernatural act and the symbol becomes identified with the thing symbolized.

RIVE-DE-GIER (45° 33′ N., 4° 41′ E.), town, on Gier, Loire, France; coal mines; glass and iron works. Pop. 15,600.

RIVER, mass of water moving down a definite channel from a higher to a lower elevation. Ratio of discharge or run-off to rainfall is estimated for Thames at Staines at less than 28 per cent.; for Rhine-Elbe, 28-29 per cent.; for Mississippi basin, 25 per cent. Differences in river régime depend upon nature of rocks of the drainage basin and their mantle of soil and vegetation, valley profile, and seasonal distribution of rainfall. Effect of irregular valley profile with concavities forming lakes is to regulate discharges below each lake. Water runs quickly off basin of impermeable rocks, especially if not forested. Forests on porous subsoil and soil arrest rapid discharge and regulate flow. Speed of river increases with slope and volume, but is diminished by friction. Average slope of many great rivers is small. A navigable river should not have greater slope than *c.* 10 in. per mile. By multiplying average speed of stream by its cross-section, volume of water passing per second may be calculated. River water carries much solid matter in suspension, amount depending not merely on volume and speed of river but also upon nature of the rock. Denudation in Thames valley reduces height by 1 foot in 9,660 years, in Ganges basin above Ghazipur by 1 foot in 617 years, in Po valley by 1 foot in 547 years.

Bed of river is subjected to vertical

and lateral erosion. If it bends, curves gradually extend, owing to more active erosion of outer bank and deposition on inner bank at each curve. Outer be- becomes steep; inner, gently sloping; should windings be cut deeply into ground, steep cliffs alternate with gently sloping spurs or tongues. Two windings may approach, and ultimately separating ground be worn away, and new and shorter channel (cut-off) formed; crescent (ox-bow) lake remains in forsaken bed. In flat lands the stream-bed is gradually raised and river easily overflows, depositing pebbles, sand, and mud over flooded area. Thus banks and beds grow higher more rapidly than surrounding land, and river bed may be at higher level than adjacent country. River then tends to divide and form loops (bayous).

Variations in hardness of rocks give rise to waterfalls or rapids, especially when strata are horizontal or dip up-stream. When rocks are soluble, river may sink beneath surface and flow under-ground, forming caverns as in Karst region (Adriatic), and surface waters may dissolve banks and cause lake-like expansions (*e.g.*) Loughs Derg and Ree in the Shannon.

The following are the rivers in the United States which exceed 1,000 miles in length: Arkansas, 2,000; Colorado, 1,360; Columbia, 1,400; Mississippi, 2,460; Missouri, 2,551; Platte, 1,260; Red, 1,200; Rio Grande, 1,800; Tennes-see, 1,200; Yellowstone, 1,100, and Yukon, 2,200.

The following are among the longest and most important foreign rivers: Amazon, 3,800; Churchill, 1,000; Dan-ube, 1,725; Euphrates, 1,700; Ganges, 1,500; Hoangho, 2,600; Niger, 2,900; Orinoco, 1,600; Rhine, 700; St. Law-rence, 2,150; Volga, 2,300, and the Yenisei, 3,300.

RIVER ROUGE, a city of Michigan, in Wayne co. It is on the Detroit and Toledo Shore and the Michigan Central railroads. Its industries, which are im-portant, include shipbuilding and bridge and steel works. Pop. 1920, 9,822.

RIVERSIDE, a city of California, in Riverside co., of which it is the county seat. It is on the Atchison, Topeka and Sante Fe, the Riverside, Rialto and Pacific, and other railroads, and on the Santa Ana river. It is the center of an extensive fruit growing region and is famous for its oranges, lemons and raisins. It has extensive irrigating canals. The city is the site of a Federal Indian School and has public libraries and a high school. Pop. 1920, 19,341.

RIVES, ALFRED LANDON (1830-1903), an American engineer, the *s.* of William Cabell Rives. He graduated from the University of Virginia, studied at the Ecole des Beaux Arts, in Paris, and on his return to the United States was an assistant engineer on the build-ing of the Capitol, in Washington, D. C., later being engaged in a similar capacity in the construction of the aque-duct there. After that he was in charge of the U. S. Survey for improving the Potomac river. During the Civil War he served as a colonel of Engineers in the Confederate Army.

RIVES, AMELIE, PRINCESS TROUBETZKOY (1863), novelist, poet, and dramatist; *b.* in Richmond, Va. She was educated by private tutors and *m.* Prince Pierre Troubetzkoy in 1896. Her first literary success was the novel *The Quick, or the Dead,* 1888. Other works: *A Brother to Dragons,* 1888; *Witness of the Sun, The Golden Rose,* 1908; *Shadows of Flames,* 1915. Plays: *Fear Market,* 1916; *Allegiance,* 1918, and *Prince and Pauper,* 1920; all produced in New York City.

RIVES, GEORGE LOCKHART (1849-1917), lawyer and historian; edu-cated at Columbia and Trinity College, Cambridge, England. Admitted to the New York bar, 1874; assistant-secre-tary of State under Cleveland, 1887-89; president of Commission to Revise New York State Charter, 1900; trustee of Columbia, 1882; of New York Public Library from 1895; president of Board, 1914. Author: *The United States and Mexico, 1821-48* (2 vols.), 1913.

RIVIERA (44° N., 8° E.), the narrow strip of coast on Gulf of Genoa, Italy, between Nice and Spezia; celebrated holiday resort.

RIVOLI (45° 34′ N., 10° 48′ E.), village, Verona, Italy; scene of Fr. victory over Austrians, 1797.

RIXDORF, suburb of Berlin, Ger-many.

RIXEY, PRESLEY MARION (1852), a surgeon-general of the United States Navy; *b.* at Culpeper, Va.; *s.* of Presley Morehead and Mary F. Jones Rixey. He was educated at the University of Virginia and at the Jefferson Medical College, Philadelphia. After being an assistant surgeon in the U. S. Navy for 4 years, he became a surgeon in 1888 and in 1902 was made a surgeon-general with the rank of rear-admiral. He resigned from the Navy in 1910 but was recalled to active service in 1917 and the following year was assigned to the Bureau of Medicine and Surgery, Navy Dept.

RIZAL, JOSÉ (1861-1896), a Filipino patriot; *b.* in Catamba, Luzon. He was the *s.* of Tagal parents and received his early education for the priesthood in his native town. He later studied at the Jesuit school at Manila. As a Tagal he was derided by the Spanish students and in other ways his prejudice against the Spaniards was aroused. He abandoned the priesthood and studied medicine at Manila, Paris, Heidelberg and Leipzig. Learning of the ignorance of the Philippines in Europe, he wrote a novel portraying his birthland, which was published in 1887 but which was forbidden by the church. A sequel was published in 1891. In 1887 Rizal went to Hong Kong, where he organized the Philippine League, which later developed into the Revolutionary Society of the Sons of the Nation. For several years he constantly agitated revolt of the Filipinos, and in May, 1892, returned to Manila. He was at once arrested and sent into exile, but in 1895 was permitted to return. Later he was arrested in Barcelona and was tried and condemned to death. He was shot on December 30, 1896.

RIZZIO, DAVID, RICCIO (*c.* 1532-66), Ital. musician; sec. to Mary Queen of Scots; murdered in her presence in supper-room, Holyrood Palace, by Darnley and others.

ROACH. See under CARPS.

ROADS are lines of communication constructed from place to place for vehicular and pedestrian traffic. 'Road' is applied generally to a broad way, 'street' is restricted to ways which pass through cities, towns, and villages.

The Romans were the first European people to construct roads scientifically and secure their permanency. The oldest and most famous of Roman roads was the Appian Way, commenced in 312 B. C. and named after Appius Claudius. The construction of the Roman road is characteristic of the people who invented it; it follows a geometrically straight line without deviation according to the contour of the land, and in solidity it is almost imperishable. Two trenches were first constructed indicating the breadth of the road. The interspace was then excavated until a solid foundation was reached. Slabs of stone were then laid on the foundation and consolidated by mortar; the second layer consisted of rubble, the third of fine concrete, and the fourth of a finely fitted mosaic of polygonal pavement stones. The total depth of the construction was frequently as much as 4 ft. The width was usually about 15 ft. Pavements of about 7 ft. in width frequently bordered the Roman way. The Latin expression for road-making, *munire viam* (lit. 'to fortify a way'), is graphic. Some of the anc. Roman roads are in a state of perfect preservation today; and others form the foundation for more modern ways.

The Roman methods were adopted to some extent in France in the 19th cent., but the anc. type has now been superseded by less costly and less massive types. The two principal modern systems are the Telford and the Macadam methods. The Telford road rests on a built foundation; the Macadam road consists of several layers of broken stones. This road pavement of wood consists of a layer of concrete, on which is laid a layer of wood, and which is finally covered with a thin layer of tar-Macadam.

In concrete roads the stone or clinker is broken into nodules of about 2 in. in diameter. The stones are then laid between layers of cement to a depth of about 7 in., and are then rammed down to a depth of 6 in. In metalled roads the 'soiling' or lower layer of metalled work consists of lighter and cheaper materials.

ROANNE (46° 2′ N., 4° 4′ E.), town, Loire, France; ancient *Rodumna*; cottons, woolens. Pop. 36,697.

ROANOKE a city of Virginia, in Roanoke co. It is on the Norfolk and Western and the Virginian railroads, and on the Roanoke river. It is the center of an extensive iron mining and farming region. Its industries include machine shops, rolling mills, bottle works, locomotive and car works, iron and steel works, sawmills, coffee and spice mills, etc. It is the seat of the Virginia College for Women and has a sanitarium and several hospitals. Pop. 1920, 50,892.

ROANOKE, a riv. of Virginia and N. Carolina, formed by the Dan and Staunton rivers. Rising in the Alleghany Mts., it flows across the Appalachian valley and then S.E. out into the W. end of Albemarle Sound. Length 388 m., navigable to Weldon for steamers. There is a canal round the falls at Halifax.

ROASTING. See COOKERY.

ROBBEN ISLAND (33° 47′ S., 18° 23′ E.), small flat island in Table Bay, S. Africa; leper and convict establishments.

ROBBERY. See THEFT.

ROBBINS, WILFORD LASH (1859), an American clergyman; *b.* at Boston, Mass.; *s.* of Robert Lash and Elizabeth Falconer Robbins. He was educated

at Amherst and at the Episcopal Theological School. In 1884 he became a deacon and the following year was ordained a priest of the Protestant Episcopal Church, after which he was a rector of the Church of Our Redeemer at Lexington, Mass., from 1885-87, dean of All Saints' Cathedral, Albany, 1887-1903 and then was dean of the General Theological Seminary, at New York until 1916. Author: *An Essay Toward Faith*, 1900, and *A Christian Apologetic*, 1902.

ROBECK, SIR JOHN MICHAEL DE (1862), Brit. admiral; entered navy, 1875; vice-admiral, 1917; commanded naval force at Dardanelles; commander-in-chief in Mediterranean since 1919; cr. baronet, 1919.

ROBERT I., ROBERT BRUCE, BRUS (1274-1329), Scot. king and national hero; of Norman descent; great-grandson of Robert le Brus, 4th lord of Annandale, by Isabel, 2nd *dau.* of David, Earl of Huntingdon, *bro.* of William the Lion of Scotland. His grandfather was one of three claimants to Scot. throne on death of 'Maid of Norway.' Bruce swore fealty to Edward I., 1296; joined Wallace, 1297; one of four regents who continued struggle in Baliol's name, 1299, but submitted when Edward again marched north; murdered his rival, Comyn, in quarrel in a church, 1306; crowned king at Scone, March 27, 1306; fled on news of Edward's approach; Edward *d.* at Burgh-on-Sands. The Eng. army under Pembroke scoured Scotland for Bruce, who led wild life in hiding, collecting forces; Pembroke captured his castles and confiscated his estates and Bruce was excommunicated. The tide turned, 1307; Bruce won battle of *Loudon Hill*, and by 1309 was lord of most of Scotland; Edward II. was compelled to retreat, 1309; Stirling alone held out. A large Eng. army under Edward II., marching to relief, was decisively defeated at *Bannockburn*, June 24, 1314, by superior skill of Bruce. Invasions of England extorted recognition of independence of Scotland by Treaty of Northampton, 1328. Bruce died of leprosy.

ROBERT II. (1316-90), king of Scotland; *s.* of Walter the Steward and Robert Bruce's *dau.* Marjory; succ. uncle, David II., 1371. Founded Stewart dynasty.

ROBERT III. (1340-1406), king of Scotland, succeeded his *f.* Robert II. in 1390. The war with England broke out again on the accession of Henry IV. in 1399. In August of the following year, Henry entered Scotland at the head of a powerful army, and advanced as far as Edinburgh, which was, however, successfully defended by the king's eldest son, the Duke of Rothsay. In the following year, however, Henry Percy (Hotspur) made a more destructive inroad as far as Preston in East Lothian. In consequence of the successes of the English, attempts were made to arrange a peace between the two countries, but without success. Hostilities, however, had been for a considerable time suspended by these negotiations, when King R. resolved to send his only surviving son, James, Earl of Carrick, to France; and the prince, then in his eleventh year, was captured at sea by an English vessel, Mar. 30, 1405. His detention by King Henry is believed to have broken the heart of his father, who expired at the castle of Rothsay in Bute. He was succeeded by his son, James I.

ROBERT II. THE PIOUS (*c.* 970-1031), king of France; succ. his *f.*, Hugh Capet, 996; excommunicated for uncanonical marriage with cousin, Bertha, Countess of Blois; submitted after long struggle with papacy.

ROBERT OF GLOUCESTER (fl. late XIII. cent.), Eng. chronicler; notable in early history of prosody as user of 'fourteener' verses.

ROBERT OF JUMIÈGES bp. of London, 1044; abp. of Canterbury, 1051-52; *d.* 1070.

ROBERT I. THE DEVIL (*d.* 1035), Duke of Normandy; aided Edward the Confessor and was *f.* of William the Conqueror. His grandson, Robert II. (*d.* 1134), succ. William the Conqueror as Duke of Normandy, 1087.

ROBERT COLLEGE Constantinople, Turkey, institution that derives its name from its founder, Christopher R. Robert, of New York, whose total contributions for its support aggregated $450,000. It was opened in 1863 and in the following year was affiliated with New York University. Its first president, Rev. Cyrus Hamlin, D.D., was succeeded in 1877 by Rev. George Washburn, D.D. The general course of study is similar to that of most other colleges, and instruction is given in 13 languages. It has handsome buildings on the shores of the Bosporus and was unmolested during the World War. It has been an instrument of great good in the Near East. In 1923 its students numbered 605 and it had a staff of 74 teachers. The president in 1923 was Charles F. Gates, D.D. The institution has an endowment fund of $1,750,000.

ROBERTS, CHARLES GEORGE DOUGLAS (1860), a Canadian poet and author. Professor of English and French

literature at King's College, Nova Scotia, 1885-7 and of Economics, 1887-95 His verse publications include: *Orion, and Other Poems*, 1880; *Ave: an Ode for the Shelley Centenary*, 1892; *The Book of the Native*, 1898; *Collected Poems*, 1900; *The Book of the Rose*, 1903. R's prose works include: *Around the Camp Fire, A Hist. of Canada, A Sister to Evangeline, By the Marshes of Minas, Haunters of the Silences, Kings in Exile.*

ROBERTS OF KANDAHAR (FREDERICK SLEIGH ROBERTS) 1ST EARL (1832-1914), Brit. soldier; was second lieutenant in Bengal Artillery, 1851; served through the Ind. Mutiny; after relief of Delhi won V.C. at Khudaganj, Jan., 1858; assistant quartermaster-general of the Bengal Brigade during Abyssinian expedition, 1868; served in same capacity in Lushai expedition, 1871-72; appointed to command of Punjab Frontier Force, 1878; led one of three columns in demonstration against Amir of Afghanistan, and turned position of enemy in Peiwar Kotal Pass; promoted major-general, made K.C.B., and received the thanks of Parliament, 1878; after murder of Cavagnari, advanced on Kabul, which he occupied; heavily attacked, but made effective resistance; accomplished famous march to relief of Kandahar, Aug., 1880; received baronetcy and G.C.B., and appointed to command of Madras army; returned to England owing to ill-health, but took up Madras command, 1881-85, and did much to improve Indian army. Created a peer, 1892; finally left India, 1893. During two years of leisure wrote *Forty-one Years in India.* Field-marshal, 1895, and commander-in-chief in Ireland. Lost his only *s.*, Lieutenant Frederick Hugh Cherston Roberts, at Colenso (subsequently awarded V.C.). Took field as commander-in-chief in South Africa with Kitchener as his chief of staff, and on Feb. 8, 1900, reached Modder R. For his campaign, see under South Africa. On his return received an earldom and the Garter. As commander-in-chief was associated for three years with Mr. Brodrick, and encouraged intelligence and initiative in the army. Retired Feb. 18, 1903, receiving the public thanks of King Edward VII., who said of him: 'For over fifty years in India, Africa, and at home he has performed every duty entrusted to him with unswerving zeal and unfailing success.' Devoted his latter years to advocacy of national service. On his eightieth birthday presented with public testimonial of $25,000, which he gave to National Service League. When Ind. soldiers arrived on Western front during the World War, he said: 'I must go and see the Ind. soldiers; it is the most useful thing I can do at this moment.' Arrived in France, Nov. 11, saw the soldiers next day, but contracted a chill and died within sounds of the guns at 8 p. m. on Saturday, Nov. 14, 1914. Buried in St. Paul's Cathedral.

ROBERTS, ELLIS HENRY (1827-1918), American financier and governmental executive; *b.* Utica, N. Y. He graduated at Yale in 1850 and the following year became editor and proprietor of the Utica Morning Herald. He was elected to Congress in 1871, serving two successive terms, and in 1889 was appointed by President Harrison assistant treasurer of the United States. In 1893 he was president of the Franklin National Bank in New York City and in the latter year was made United States Treasurer by President McKinley. His publications include *Government Revenues*, 1884 and *The Planting and Growth of the Empire State*, 1887.

ROBERTS, FRANK HUNT HURD (1869), an American college president; *b.* in Mount Vernon, Ohio. Graduated in 1892 from Ohio University. Engaged in newspaper work in Ohio, 1889-93, and was principal of Wyoming State Normal School, 1899-1903. Since 1921, president of Jr. College and principal of High School at El Paso. Author of: *A Comparative Study of the State and Nation*, 1900; *Civil Government*, 1902; *Civil Government of Wyoming*, 1902 (3rd edition), 1904; *History and Civics of New Mexico* (5th edition), 1918; *The Constitution of Colorado.*

ROBERTS, GEORGE EVAN (1857), ex-director of the Mint; *b.* in Delaware County, Ia.; *s.* of David and Mary Harvey Roberts. After receiving a common school education in Iowa, he learned the printers trade, and later in addition to being the proprietor of the Fort Dodge Messenger from 1878-1909, was state printer of Iowa from 1883-89, and director of the Mint, 1898-1907, and again 1910-14. He was then assistant to the president of the National City Bank of New York until 1919, when he became a vice-president of same. Author: *Money, Wages and Prices*, 1897, and others.

ROBERTS, KENNETH LEWIS (1885), American author; *b.* Kennebunk, Me. He graduated at Cornell University in 1908. During the last three years of the course he was editor in chief of The Cornell Widow. He was a columnist on the Boston Post, 1909-17; member of the editorial staff of Puck, 1916-17, and on the staff of Life, 1915-18. He served as captain of the Intelligence Section of the Siberian Ex-

peditionary Force, 1918-19, and was foreign correspondent of the Saturday Evening Post in the Balkans and Central Europe, 1919-21. Since the latter date he has been Washington correspondent of the same periodical. His publications include *Europe's Morning After*, 1921, and *Why Europe Leaves Home*, 1922. In conjunction with Robert Garland he wrote the play *The Brotherhood of Man*, 1919.

ROBERTS, MORLEY (1857), Eng. novelist and journalist; worked in Australian bush, 1874-79; returning to England, was employed in Civil Service; traveled in America, 1884-86, and, more lately, in South Seas, Cape Colony, Teneriffe, Corsica, etc.; author of *King Billy of Ballart, Lady Penelope*, 1905; *Sea Dogs*, 1910; *Hearts of Women*, 1919; *Warfare in the Human Body*, 1920.

ROBERTS, WILLIAM HENRY (1844), American clergyman; *b.* Holyhead, Wales. He graduated at the College of the City of New York in 1863; at the Princeton Theological Seminary in 1873, and in the same year was ordained to the ministry of the Presbyterian church. He has held pastorates at Cranford, N. J., 1873-77, and at Trenton, N. J., 1895-1900. He served as statistician of the Treasury Department at Washington, 1863-65, and from 1866 to 1871 was assistant librarian of Congress. From 1886 to 1893 he was professor of practical theology at Lane Theological Seminary, Cincinnati, Ohio. He was moderator of the General Assembly in 1907 and chairman of the Conference on Organic Union, 1918-19. His publications include *History of the Presbyterian Church*, 1888; *Laws Relating to Religious Corporations*, 1896, and *Manual for Ruling Elders*, 1897.

ROBERTSON, ALICE MARY (1854), a United States Congresswoman; *b.* of missionary parents at Tullahassee Mission, Indian Territory. She was educated at Elmira (N. Y.) College. She was for many years engaged in missionary and educational work among the Indians and was government supervisor of the Creek Indian schools from 1900-05. She was then postmistress, by personal appointment of Theodore Roosevelt, until 1913, after which she owned the Sawokla Farm Dairy and Cafeteria until 1920, and then became a member of the 67th Congress, 1921-23, 2d Oklahoma Dist.

ROBERTSON, ARCHIBALD THOMAS (1863), an American theologian; *b.* near Chatham, Va. Graduated in 1885 from Wake Forest College and from the Southern Baptist Theological Seminary in 1888. Since 1895 at the Southern Baptist Theological Seminary as professor of interpretation of the New Testament. Among his books are: *The Glory of the Ministry*, 1911; *A Grammar of the Greek New Testament in the Light of Historical Research*, 1914; *The Pharisees and Jesus*, 1920; *Paul the Interpreter of Christ*, 1921; *Harmony of the Gospels for Students of Life of Christ*, 1922.

ROBERTSON, FREDERICK WILLIAM (1816-53), Anglican divine; studied law, then worked for army, but went to Oxford and was ordained; an earnest and able preacher and spiritual leader, though not a great thinker; had considerable influence.

ROBERTSON, THOMAS M. (1857), chief economist; *b.* at Alamance co., N. C. Teacher in the public schools and later principal of an academy until 1887. From 1893-95, a member of the North Carolina House of Representatives. He was with the United States Treasury Department at Washington, 1895-97, and with the Department of Labor, 1890-1903. In charge of investigations of water power and lumber industry and special examiner of the Bureau of Corporations, 1904-15. Member of the board of review, 1919, and acting chairman, 1920-22.

ROBERTSON, THOMAS WILLIAM (1829-71), Eng. dramatist and actor; produced several plays in the 'sixties such as *David Garrick*, *Society*, and *Caste*.

ROBERTSON, WILLIAM (1721-93), Scot. historian and Presbyterian minister; member of General Assembly, 1746; nominated to Edinburgh living, 1756; pub. *History of Scotland*, 1759, which speedily ran through numerous editions; principal of Edinburgh Univ., 1762; royal historiographer, 1763; pub. *Charles V.*, 1769; excellent at generalization; style good, but not brilliant.

ROBERTSON, SIR WILLIAM ROBERT (1860), Brit. soldier; entered army as private; lieutenant in 3rd Dragoon Guards, 1888; commandant of the Staff Coll., 1910-13. Quartermaster-general when the World War began, he won golden opinions from the commander-in-chief, and was described as having 'an iron constitution, no nerves and nothing disturbs him.' Chief of General Staff, B. E. F., 1915; chief of Imperial General Staff, 1915-18. Present at historic conference of the Allies in Paris, March, 1916. Appointed to the Eastern Command, Feb., 1918. In June became general officer commanding in chief, Great Britain, 1918-19; subsequently commanded Rhine Army in Germany, 1919-20; cr. baronet and

received grant of $50,000, 1919; field-marshal, 1920. Has been the recipient of numerous decorations and honors.

ROBES. See COSTUME.

ROBESPIERRE, MAXIMILIEN MARIE ISIDORE (1758-94), Fr. revolutionist, was a lawyer *b.* at Arras who early imbibed the views of Rousseau. In 1789 he was elected a member of the states-general for Artois, and was among the deputies of the extreme Left. He took little part in the proceedings of the Assembly, but during 1790 he became a great influence at the Jacobins Club. On May 10, 1791, he carried his fatal motion, that no member of the Constituent Assembly should be elected to the forthcoming Legislative Assembly. From the Jacobin side violently opposed the war policy advocated by the party which afterwards became the 'Gironde.' In the Convention he was elected first deputy for Paris, and with Danton and Marat withstood the charge brought by the Girondists against the Jacobins of aiming at a dictatorship. He urged the execution of Louis XVI. as a matter of policy, and on Dec. 3, 1792, spoke against granting the king a trial. On the triumph of the Mountain over the Gironde, which was largely his work, he became the leading man in France, and on July 27, 1793, was elected a member of the Great Committee of Public Safety. He was one of the chief authors of Reign of Terror and pursued one party after another with relentless animosity. With Danton's execution in April, 1794, begins the last phase of the career of Robespierre. He openly declared that his aim was to extirpate the vicious and to establish a reign of virtue. He carried a resolution recognizing a Supreme Being, and in the Fête de l'Etre Suprême, June 8, 1794, set up a new cult, with himself as high priest. With these Puritan views the leading men of the day had no sympathy, and they organized the revolution of 9th Thermidor, July 27, 1794, in which Robespierre fell. He was guillotined July 27, 1794. His political ideas are fully exhibited in his speeches. He was a fanatic, cold-blooded, but sincere; not a great administrator, nor a statesman at all. He had a touch of the feline, which fascinated his contemporaries against their will. But he owed his position in the main to his transparent sincerity and honesty.

ROBIN. See under THRUSH FAMILY.

ROBIN GOODFELLOW. See PUCK.

ROBIN HOOD, Eng. mediæval hero, frequently mentioned in literature from XIV. cent.; probably historical character; there is no reason to doubt existence of famous brigand when historical basis is conceded to earlier Arthurian legends; variant name, Robin o' the Wood; depicted as brave and chivalrous adventurer who had his headquarters in Sherwood Forest, where he levied toll upon travelers. Friar Tuck and Maid Marian are probably later additions to story. R. H. was popular hero as Arthur was pattern of nobility.

ROBIN HOOD'S BAY (54° 27′ N., 0° 31′ W.), inlet and seaside resort, Yorkshire, England.

ROBINIA, genus of trees, order Leguminosæ; flowers pink or white. Chief species, the Locust tree of America, yields hard wood of value.

ROBINS, ELIZABETH (1865), (Mrs. George Richmond Parkes), American actress and author; *b.* Louisville, Ky. Much of her theatrical work has been done in England where she was accepted as a gifted interpreter of Ibsen roles. She has made extensive contributions to magazines and has written many novels, among which may be cited *George Mandeville's Husband, The New Moon, An Open Question, The Magnetic North, Under the Southern Cross, Come and Find Me, The Mills of the Gods, My Little Sister* and *Way Stations.*

ROBINS, RAYMOND (1873), American welfare worker and social economist; *b.* Staten Island, N. Y. He was educated at the public schools and also studied under private teachers. He was superintendent of the Chicago Municipal Lodging House, 1902-05, and during part of the same period was head worker in the Northwestern University Settlement. He was the candidate of the Progressive party for U. S. Senator in 1914, but was defeated. In 1915-16, he was a leader in the National Christian Evangelistic Social campaign in American universities and colleges. He was commissioner and major (later colonel) U. S. A. commanding the American Red Cross Mission in Russia, 1917-18, and on his return to this country gave evidence before a Congressional Committee concerning affairs in Russia under the Soviet Government. He was a member of the executive committee conducting the Republican national campaign in 1920.

ROBINSON, CORINNE ROOSEVELT (MRS. DOUGLAS ROBINSON) (1861), an American authoress; *b.* at New York City; *dau.* of Theodore and Martha Bulloch Roosevelt. She was educated principally under private tutors. Her husband, Douglas Robinson, of New York, whom she *m.* in 1882, *d.* in 1918. In addition to being a director

of many charities during the World War she was actively engaged in Red Cross, Salvation Army and Liberty Loan work. Author: *The Call of Brotherhood* (poems), 1912; *One Woman to Another*, 1914; *Service and Sacrifice*, 1919; *My Brother Theodore Roosevelt* and also, *Collected Poems*, 1921.

ROBINSON, EDWARD (1794-1863), American Biblical scholar and philologist; chief work, *Biblical Researches in Palestine and Adjacent Countries*, 3 vols.

ROBINSON, EDWARD (1858), American art director; *b.* Boston, Mass. He graduated at Harvard in 1879 and then pursued postgraduate studies for 5 years in Greece, Germany and England. He was curator of classical antiquities in the Boston Museum of Fine Arts, 1885-1902, and for the next three years was director of the same institution. He became connected as assistant director of the Metropolitan Museum of Art, New York City, 1906-10, and since the latter date has been full director. He has also been very active in the selection and purchase of collections for art museums in cities other than New York. His contributions to art and archæological journals have been valuable and extensive.

ROBINSON, EDWIN ARLINGTON (1869), American author; *b.* at Head Tide, Maine. He received his education at Gardiner, Me., and at Harvard University (1891-93). His publications include *The Torrent and the Night Before*, 1896; *The Children of the Night*, 1897-1905; *The Town Down the River*, 1910; *Van Zorn*, play, 1914; *The Porcupine*, play, 1915; *The Man Against the Sky*, poems, 1916; *Launcelot*, poem, 1920; *The Three Taverns*, poems, 1920; *Avon's Harvest*, poem, 1921 and *Collected Poems*, 1921.

ROBINSON, JAMES HARVEY (1863), American author and lecturer; *b.* Bloomington, Ill. He graduated at Harvard in 1887 and received the degree of Ph. D. from Freiberg University, Germany in 1890. In 1891 he was lecturer on European history at the University of Pennsylvania. He became connected with Columbia University as associate professor of history (1892-95) and full professor (1895-1919). Since 1919 he has been an organizer and lecturer for the new school for Social Research, New York City. He has edited and published many translations from the original sources of European history; was editor for the Annals of the American Academy of Political Science (1891-95), and associate editor of the American Historical Review (1911-20). His publications include *The German Bundesrath*, 1891; *Petrarch the First Modern Scholar and Man of Letters*, written in conjunction with H. W. Rolfe, 1899; *Introduction to the History of Western Europe*, 1903; *The New History*, 1911; *Mediæval and Modern Times*, 1915 and the *Mind in the Making*, 1921.

ROBINSON, JOHN (1575 - 1625), Eng. clergyman; founded church in Leiden which produced Pilgrim Fathers (*q.v.* under Massachusetts).

ROBINSON, JOHN (1846), an American botanist; *b.* at Salem, Mass., *s.* of John and Lucy Pickering Stone Robinson. He was educated under private instruction in schools at Salem supplemented by courses in botany at Harvard. He was trustee of the Peabody Museum, Salem. Author: *Ferns in Their Homes and Ours*, 1878; *The Marine Room of Peabody Museum*, 1921 and others and contributed on subjects connected with botany and forestry in publications of Essex Institute, Mass. State Board of Agriculture, etc.

ROBINSON, JOSEPH TAYLOR (1872), American legislator; *b.* Lonoke, Ark. He was admitted to the bar in 1905 and practiced law at Little Rock, Ark. He was a member of Congress from 1903 to 1913 from the Sixth Arkansas District and in the latter year becoming Governor of Arkansas. Shortly afterward he resigned the gubernatorial chair and was elected to the U.S. Senate. He served with distinction in that body and has been one of the leaders of the Democratic side. He was re-elected Senator in 1918 for the term expiring in 1925.

ROBINSON, WILLIAM JOSEPHUS (1869), an American physician and writer; *b.* at Mount Morris, New York. He graduated from Columbia University, College of Pharmacy and from the medical college of New York University. He had postgraduate work at the University of Berlin and Vienna. He was a lecturer on chemistry—pharmacology and materia medica of the Board of Pharmacy Institute, New York. At the Bronx Hospital and Dispensary he was president of the medical board. Founder and editor of *Critic & Guide*. Author of *Never Told Tales*, 1908; *Sexual Problems of Today*, 1912; *Practical Eugenics*, 1912; *Sex Morality*, 1912; *Eugenics and Marriage*, 1917.

ROBINSON CRUSOE. See DEFOE.

ROB ROY, ROBERT M'GREGOR (1671-1734), the Scot. Robin Hood, subject of one of Scott's novels. His exploits are matters of familiar knowledge.

ROBSART, AMY. See LEICESTER, ROBERT DUDLEY, EARL OF.

ROBSON, MAY (1865), American actress; *b.* Australia. She came to the United States in 1879 and made her first appearance on the American stage in 1884 in The Hoop of Gold. Under the direction of Daniel Frohman, she appeared in the Madison Square and Lyceum Theaters, New York (1886-93) and was later under the management of Charles Frohman (1893-96). Her debut as a star was made in The Rejuvenation of Aunt Mary in 1907. She appeared in the same play in London in 1910 and scored a marked success. With C. T. Dazey she is the author of the play *A Night Out*, 1911. She toured the country in *Tish*, 1919-21.

ROC, RUKH, bird in *Arabian Nights* which carried Sindbad from Valley of Diamonds.

ROCHAMBEAU, JEAN-BAPTISTE-DON-ATIEN DE VIMEUR, COMTE DE (1725-1807), Fr. soldier; marshal of France; sent as lieutenant-general to America, 1780, and obtained capitulation of Cornwallis at *Yorktown*. His *s.*, Donatien-Marie-Joseph (1750 - 1813), was distinguished general.

ROCHDALE (53° 37′ N., 2° 10′ W.), town, on Roch, Lancashire; woolens, cottons; seat of first co-operative society (1844). Pop. 1921, 92,700.

ROCHE, ARTHUR SOMERS (1883), American author; *b.* Somerville, Mass. He studied at Holy Cross College, (1899-1901), began the practice of law but abandoned the profession after 18 months and devoted himself to journalism and authorship. He has contributed extensively to magazines since 1906. He served abroad during the World War in the Military Intelligence Department. His publications include *Plunder*, 1917; *Ransom*, 1918; *The Eyes of the Blind*, 1919; *Uneasy Street*, 1920; *Find the Woman*, 1921; and *The Day of Faith*, 1921. He was co-author of the play *A Scrap of Paper*, produced in 1917.

ROCHE, SIR BOYLE, Bart. (1743-1807), Irish politician and soldier; celebrated for Irish 'bulls.'

ROCHE, JAMES JEFFREY (1847-1908), American author and editor; *b.* Mountmellick, Ireland. He received his education at St. Dunstan's College, Charlottetown, Prince Edward Island, and in 1883 became assistant editor of the Boston Pilot, of which publication he was editor-in-chief from 1890 to 1905. He was United States Consul at Genoa, Italy (1904-07) and at Berne, Switzerland (1907-08). His publications include *Songs and Satires*, 1886; *The Story of the Filibusters*, 1891; *Her Majesty, the King*, 1898 and *Sorrows of Sap'ed*, 1904.

ROCHEFORT (45° 56′ N., 0° 57′ W.), fortified seaport, on Charente, Charente-Inférieure, France; important naval station, with arsenal, hospital, and other establishments; naval and commercial harbor; ship-building yards. Pop. 36,000.

ROCHEFORT - LUÇAY, VICTOR HENRY, MARQUIS DE, HENRI ROCHEFORT (1831-1913), brilliant Fr. journalist; editor of *La Patrie*, founder of *La Lanterne*, 1868; *La Marseillaise*, 1869; *L'Intransigeant*, 1880; a leader in Commune, 1871; transported to New Caledonia, 1873; escaped, 1874; returned to Paris, 1880; attacked Thiers, supported Boulanger, stirred up feeling against Panama scandals, 1892-95, and against Dreyfus, 1897-99; author of frequently acted vaudevilles and novels.

ROCHEFAUCAULT, LA. See LA ROCHEFAUCAULT.

ROCHELLE, LA, a fortified city and seaport of France, on the Atlantic coast, cap. of the dept. of Charente-Inférieure. The chief buildings are the cathedral, in massive Grecian style, with a dome; the town house, resembling a fortress; the episcopal palace, with a library of 25,000 volumes and a museum; and the arsenal. Pop. 34,000.

ROCHELLE SALT, or **SEIGNETTE'S SALT,** tartrate of sodium and potassium ($KNaC_4H_4O_6+4\ H_2O$), discovered by Seignette of Rochelle. It is a colorless solid, forming rhombic prisms, is soluble in water, and possesses a saline taste. It is prepared by neutralizing acid potassium tartrate with sodium carbonate, and concentrating the solution until solidification is imminent, when it is allowed to crystallize.

ROCHESTER, a city and seaport, municipal and parl. bor. of Kent, England, situated on the Medway, opposite Strood, 30 m. E.S.E. of London. An ancient town, it was the seat of a bishop in the 7th century. There is an old castle, the remains of an old priory, and the 12th century church of St. Andrew. It carries on many industries and returns a member to parliament. Pop. 32,000.

ROCHESTER, a city of Minnesota, in Olmsted co., of which it is the county seat. It is on the Chicago and Northwestern, and the Chicago, Great Western railroads, and on the Zumbro river.

It is an important industrial city and has manufactures of wagons, furniture, and agricultural implements. It has a State Hospital for the Insane, St. Mary's Hospital and a Roman Catholic Seminary. St. Mary's Hospital was endowed by the Mayo brothers, famous surgeons. Many people from all parts of the country have in recent years come to this hospital for examination and operation. Pop. 1920, 13,722.

ROCHESTER, a city of New Hampshire, in Strafford co. It is on the Boston and Maine Railroad and on the Cocheco river. It has important manufactures of brass, woolen goods, brick, leather and lumber. There is a public library. Pop. 1920, 9,673.

ROCHESTER, a city of New York, in Monroe co., of which it is the county seat. It is on the New York Central, the Erie, Lehigh Valley and Pennsylvania, and the Buffalo, Rochester and Pittsburgh railroads, and on Lake Erie and the New York State Barge Canal. The canal is an outlet for heavy freight and there is a harbor in the center of the city. Rochester is an important industrial city. There are over 1650 establishments turning out 350 different commodities. The city leads in the production of cameras, camera supplies, optical goods, filing devices and office systems, soda fountains, fruit syrups, etc. It is also first in the production of ivory buttons and is the headquarters for the nursery business of the United States. It ranks fourth in the production of shoes, and men's clothing. It is also a large machinery center and has several automobile factories. The city is handsomely laid out. It has a large park system created in 1888, which has been enlarged year by year until the total area of park territory is nearly 20,000 acres. In the schools are registered nearly 50,000 pupils. There are five high schools, over 30 parochial schools and many private institutions. It is the seat of the University of Rochester, the Rochester Theological Seminary and St. Bernard's Theological Seminary. There are two large public libraries, and many smaller libraries. The first permanent settlement made here was in 1810 by Nathaniel Rochester. It was incorporated in 1817 and received a city charter in 1834. Pop. 1920, 295,750.

ROCHESTER, a borough of Pennsylvania, in Beaver co. It is on the Pennsylvania System and on the Ohio river. The city is the center of an extensive industrial region and nearby are deposits of gas, oil, clay and building stone. It has manufactures of glass, structural steel, pottery, stoves, lumber products, etc. Pop. 1920, 6,957.

ROCHESTER, JOHN WILMOT, 2ND EARL OF (1647-80), Eng. wit, *b.* Ditchley, Oxfordshire. He was a reprobate at the court of Charles II., but in spite of his excesses his wit was keen to the end. He is the author of the famous epitaph on Charles II.:—

'Here lies our sovereign lord the king,
Whose word no man relies on;
He never said a foolish thing,
Nor ever did a wise one.'

To which Charles is said to have replied, 'My words are my own, my acts are my ministers'.'

ROCHESTER, LAWRENCE HYDE, EARL OF (1641-1711), Brit. statesman; first lord of treasury (one of 'the Chits'), 1679-84, 1685-87; pres. of Council, 1684-85, 1710-11; led Tory reaction under Charles II.; able and conscientious; wife, Henrietta, a famous beauty.

ROCHESTER, UNIVERSITY OF, institution at Rochester, N. Y. Established in 1850 under Baptist auspices. It has been co-educational since 1900, and in 1909 a co-ordinate college was established especially for women under the same teachers as those of the main institution. In addition to the ordinary college curriculum, courses are offered in mechanical and chemical engineering. The campus and athletic field cover thirty-nine acres and are adorned with beautiful and modern buildings. There are more than 80,000 volumes in the library, and the laboratories and museums are thoroughly equipped. The endowment of the university is $14,538,011. In 1923 there were 819 students in attendance and the faculty numbered 68 members.

ROCHET, white linen garment with sleeves, worn by bp's in Roman and Anglican churches; in R.C. Church it is short and edged with lace; in Anglican Church long and with full sleeves, and is worn under chimere.

ROCK. See GEOLOGY; PETROGRAPHY.

ROCK-CRYSTAL, pure silica $(SiO_2)n$, crystallized, colorless, six-sided prisms; found in quartz veins of granite, especially in Switzerland; used for spectacle lenses.

ROCKEFELLER, JOHN DAVISON (1839), an American capitalist; *b.* in Richford, N. Y. At the age of fourteen he moved with his parents to Cleveland, Ohio, where he received a public school education. Beginning as a boy in a store, he became a clerk in a forwarding and commission house, and at the age of 19 was partner in the commission

firm of Clark & Rockefeller. In 1860 this firm became Andrews, Clark, & Co., and began engaging in the oil business, an industry which was then in its infancy. Seven years later, this firm, now Rockefeller, Andrews & Flagler, began operating a large refinery in Cleveland, and in 1870 it was consolidated with a number of others into the Standard Oil Co. This corporation grew so rapidly that it was converted into a trust in 1882. Its operations, of which Mr. Rockefeller was head and brains, have been much criticized, his tactics in destroying all of his competitors who would not enter the trust being peculiarly merciless, but the result was a monopoly unique in the industrial history of the world. So strong was the popular sentiment which developed against it that in 1892 it was legally dissolved by the courts, the component parts being thereafter operated as separate corporations. Mr. Rockefeller remained at the head of the entire business until 1911, when he retired, the wealthiest man in the world. Of his vast fortune he has devoted about $300,000,000 to charities.

ROCKEFELLER, JOHN DAVISON, JR. (1874), an American capitalist; *s.* of John Davison Rockefeller, founder of the Standard Oil Co., *b.* in Cleveland, Ohio. He was graduated from Brown University, in 1897, after which he entered into the oil business with his *f.*, later being a director of the Colorado Fuel & Iron Co., at a time when this corporation gained a great deal of notoriety on account of its labor troubles. Mr. Rockefeller's activities in business, however, have become secondary to his interests in the various philanthropies established by his *f.*, being chairman of the Board of Directors of the Rockefeller Foundation, a trustee of the Rockefeller Institute for Medical Research and an official in a number of other similar institutions. He has been especially noted for his interest in church and Sunday school activities.

ROCKEFELLER, WILLIAM (1841-1922), American capitalist; *b.* Richford, N. Y. He was the *bro.* of John D. Rockefeller, founder of the Standard Oil Company. He was educated at Owego, N. Y. and Cleveland, Ohio. He entered business life first as bookkeeper and later as partner in the produce commission trade soon afterwards joining his *bro.* John D. in the oil business. He was head of the Standard Oil Company of New Jersey (1865-1911) and during part of the same period was also president of the Standard Oil Company of New York. He had enormous and diversified interests in scores of business, railroad and financial corporations and amassed an immense fortune.

ROCKEFELLER FOUNDATION, THE. Chartered in New York in 1913 to promote the well-being of mankind throughout the world. Its principal work is in preparing programs for public health and medical education. Resources $174,511,957. Income from all sources $7,363,863. It assists organizations not affiliated with the Foundation and makes appropriations for public health and medical schools. First class agencies are: Health Board, China Medical Board and Division of Medical Education. The International Health Board develops programs for the control of disease throughout the world. In the past few years the Foundation has been at work in 12 southern states combatting malaria and hook-worm and in 22 countries these diseases and yellow fever. During the World War and since, it has carried on a campaign against tuberculosis in France. It has appropriated funds to fight disease in Austria, Czecho-Slovakia. The foundation established a School of Public Health at Johns Hopkins University and cooperates with that of Harvard. The China Medical Board built and maintains the Peking Medical College, and aids medical schools and hospitals of China. The Division of Medical Education has assisted medical agencies in the United States, Canada, West and Central Europe and the Far East. President of Foundation, George E. Vincent. Headquarters, 61 Broadway, New York City.

ROCKEFELLER INSTITUTE OF MEDICAL RESEARCH, THE, Incorporated June 14, 1901. John D. Rockefeller donated $200,000 to carry on investigations and award scholarships and fellowships to laboratories then existing. In 1902 he donated $1,000,000 to centralize work in the Institute's own laboratory. Property on the East River front between 64th and 68th street was purchased and ceded to the Institute, and Simon Flexner resigned his professorship in pathology at the University of Pennsylvania to become the director. The Institute contains the following departments: pathology, bacteriology, physiological and pathological chemistry, physiology, comparative zoology, pharmacology and experimental therapeutics. The Institute co-operates with the Health Board of New York on public health matters. It makes grants for investigations. Reports of its work published in scientific journals are collected in 'Reprints.' When the hospital was opened in 1910, Mr. Rockefeller gave

$3,820,000. Total endowment, grounds, and buildings, $8,540,000. In addition to the Central, North Laboratory, Animal House and other buildings there is the Childrens Gardens opened in 1914 on East River front, and on Carnegie Lake opposite Princeton buildings for the department of animal pathology, a laboratory and farm. The Institute publishes the Journal of Experimental Medicine, Journal of Biological Chemistry and Studies from the Rockefeller Institute.

ROCKET.—(1) name of two species of plants; (2) cylindrical case filled with explosives, used in pyrotechnics, signalling, and life-saving apparatus.

ROCKFORD, a city of Illinois, in Winnebago co., of which it is the county seat. It is on the Illinois Central, the Chicago, Milwaukee and St. Paul, the Burlington Route, the Chicago, Milwaukee and Gary, and the Chicago, Northwestern railroads, and on the Rock river. It is an important industrial city and has manufactures of reaping machines, paper, flour, cotton, furniture, woolen goods, and watches. There are over 200 manufacturing establishments. It is the seat of Rockford College and has a U.S. Government building, a business college, hospitals, sanitarium and a public library. Pop. 1920, 65,651.

ROCKFORD COLLEGE, institution for women at Rockford, Ill., founded as a seminary in 1849 and organized as a college in 1892. It offers classical and scientific courses and also instruction in music. Grounds and buildings are valued at $200,000 and it has productive funds of about $250,000. The enrollment of students in 1923 was 333 and the faculty comprised 45 members.

ROCKHAMPTON (23° 25′ S., 150° 25′ E.), seaport, Queensland, Australia, on Fitzroy; outlet for produce of Central Queensland; frozen meat, livestock; gold, silver, copper, coal; sapphires and opals. Pop. 16,500.

ROCK HILL, a city of South Carolina in York co. It is on the Southern Railroad, and is the center of an extensive cotton-growing and agricultural region. Its industries include the manufacture of cotton, wagons, fertilizers, brick, foundry and machine shop products. Power is derived from the power plant on the Catawba and Broad river. It is the seat of the Winthrop Normal and Industrial College of South Carolina. It has a public library and a hospital. Pop. 1920, 8,809.

ROCKHILL, WILLIAM WOODVILLE (1854-1915), an American diplomat; *b.* in Philadelphia. He was educated in a military academy in France, and for a short period served in the French Army in Algiers, but returned to the United States in 1876. In 1884 he became second secretary of the U.S. Legation in Peking, China, remaining in the Orient for some years and becoming intimately familiar with conditions there. In 1896 he became First Assistant Secretary of State, the following year being sent as Minister to Greece, Rumania and Serbia, where he remained for two years. In 1900 he was sent to China, during the Boxer uprising, and in the following year signed the peace treaty on behalf of the United States. He was Minister to China in 1905; Ambassador to Russia in 1909; and to Turkey in 1911-13. He wrote *A Life of the Buddha and the Early History of his Church,* 1884; *The Land of the Lamas,* 1891.

ROCKINGHAM, a city of Vermont. Pop. 1920, 6,231.

ROCKINGHAM, CHARLES WATSON - WENTWORTH, 2ND MARQUESS OF (1730-82), Brit. Whig statesman; first lord of treasury, 1765-66, with Burke as sec.; fell through passing unpopular repeal of Stamp Act; formed second ministry, 1782; poor orator and party manager.

ROCKING STONES, large boulders or rocks, so adjusted to the base on which they rest that they move gently to and fro when agitated by the hand. R. S. have been used for purposes of divination at various times.

ROCK ISLAND, a city of Illinois, in Rock Island co. It is on the Burlington, the Chicago, Milwaukee and St. Paul, the Chicago, Burlington and Quincy, the Rock Island Southern, the Chicago, Rock Island and Pacific, and other railroads, and on the Mississippi river, which is here spanned by a railroad bridge. The city takes its name from a beautiful island in the river which is the property of the United States Government and is used as the site of a great central arsenal and foundry. A dam crossing the river furnishes abundant water power. The industries include lumber mills, machine shops, and farm implement products. Pop. 1920, 35,177.

ROCKLAND, a city of Maine, in Knox co., of which it is the county seat. It is on the Maine Central Railroad, and on the west shore of Penobscot Bay. It has an excellent harbor which has been improved by the construction of a granite breakwater. There is regular steamboat connection with Boston and other Atlantic ports.

Nearby are important quarries of fine granite of which many of the largest government buildings have been constructed. It has also an immense lime industry. Its other industries include machine shop foundries, iron and brass works, etc. There is a U.S. Government building and a public library. Pop. 1920, 8,109.

ROCKLAND, a town of Massachusetts, in Plymouth co. It is on the New York, New Haven and Hartford railroads. Its industries include the manufacture of shoes, nails, etc. There is a public library. Pop. 1920, 7,544.

ROCK SALT. See SODIUM.

ROCK OF CHICKAMAUGA. See THOMAS, GEORGE H.

ROCK RIVER, a river which rises in Wisconsin, 50 miles west of Lake Michigan, and falls into the Mississippi, 2 miles below the city of Rock Island. It has a total length of 330 miles, of which about 225 miles are navigable for small steamships.

ROCK SNAKE. See SNAKES.

ROCK SPRINGS, a city of Wyoming, in Sweetwater co. It is on the Union Pacific Railroad. It is the center of an extensive coal mining and cattle raising region. It has a State Hospital, government building, public library, city hall, Elks' building, and a Masonic building. Pop. 1920, 6,456.

ROCKVILLE, a city of Connecticut, in Tolland co. It is on the New York New Haven and Hartford Railroad, and on the Hackensack river, which furnishes abundant water power for the industrial establishments, which include woolen mills, silk mills and an envelope factory. The city has a public library. Pop. 1920, 7,726.

ROCKVILLE CENTER, a village of New York, in Nassau co. It is on the Long Island Railroad and is chiefly a residential place. It has, however, important oyster fishing interests and a lace and handkerchief factory. Its public institutions include a public library and a Catholic parochial school. Pop. 1920, 6,262.

ROCKY MOUNT, a city of North Carolina, in Edgecomb and Nash counties. It is on the Atlantic Coast Railroad and is the center of an extensive cotton and tobacco growing region It has railroad shops and manufactures of tobacco, wood products and hosiery. Pop. 1920, 12,752.

ROCKY MOUNTAINS, great complex system of mountain ranges in N. America (45° N., 110° W.); extends from Alaska to Mexico; greatest width, 1,000 m. highest peaks are in Alaska—Mt. M'Kinley (c. 20,464ft.), Mt. St Elias (18,100 ft.); many peaks are over 12,000 ft., and in Colorado U.S., forty exceed 14,000 ft.; system is source of almost all the large rivers of N. America; erosion is a prominent feature, great cañons being cut across the outer barriers by the main streams; most notable is Grand Cañon of the Colorado; many of the valleys are heavily glaciated, and numerous glaciers still exist, chiefly in Canada and Alaska; best known passes (Yellowhead, Kicking Horse, Crow's Nest, Lewis and Clark's, Hagerman, Marshall) are traversed by the great transcontinental railway lines. Chief mineral resources are gold, silver, lead, copper, coal; as a rule, agriculture is profitable only in the valleys capable of irrigation.

ROCKY MOUNTAIN GOAT (*Haplocerus montanus*), a goat-like relative of the Chamois (but no true goat) found on the Rocky Mountains from Alaska to the latitude of San Francisco.

ROCOCO. See ARCHITECTURE.

ROCROI (49° 55′ N., 4° 31′ E.), fortified town, France; scene of Fr. victory over Spaniards, 1643.

ROD, POLE, or **PERCH,** a unit or lineal measure, equivalent to 5½ yds. or 16½ ft. It is largely employed in surveying, while a square rod, or rood (16½ × 16½ = 272¼ sq. ft.), is the usual measure employed in estimating brickwork.

ROD, ÉDOUARD (1857-1910) Swiss novelist; prof. of Comparative Literature, Geneva, 1887-93; obtained wide appreciation as writer of psychological novels; among chief books are *La Course a la mort*, *Le Sens de la vie*, *L'Affaire J. J. Rousseau*.

RODBERTUS, KARL JOHANN (1805-75), Ger. politician and writer; minister of public worship and education for fourteen days in Hansemann ministry, 1848; leader of left center in lower house, 1849; retired from politics on introduction of new electoral law; called 'founder of scientific socialism.'

RODENTS, RODENTIA, GLIRES, or **GNAWERS** (Lat. *rodo*, 'I gnaw'), an order of mammals important on account of its wide distribution, for rodents occur everywhere, and on account of the extraordinary number (almost 2,700) of its species. From all other mammals they can readily be distinguished by their front or incisor teeth, which are long, parallel-sided,

and chisel-edged, this last unique feature being due to the absence or insignificance of a layer of hard enamel on the back of the tooth, so that the back wears more rapidly and leaves the front edge projecting. The incisors never cease growing, but are worn away in front by gnawing as they are pushed forward from behind. There are no canine teeth, a great gap or diastema between front and back teeth allowing a pad of cheek skin to fall within the mouth. Rodents walk on the joints of their toes, which are tipped with blunt, sometimes hoof-like, nails.

A great family likeness runs through the rodent family; they have long heads with sharp snouts projecting far beyond a small mouth. Their gnawing and the sideways motion of their jaws in chewing is very characteristic. They are typically vegetarians, but some, such as squirrels, occasionally feed on birds' eggs, or even young birds, while rats devour fish, game, birds, frogs, and at times their own kind.

Many different modes of life are exhibited by rodents. Most are protected by their nocturnal habits; but the pocket-gophers spend the whole of their lives underground, the rabbits, marmots, and many others trust to the safety of burrows, the hares to their speed of foot, the porcupines to their spiny covering, the beavers to a house entered from under water, while the squirrels live in the tree-tops. Several species hibernate.

Of peculiar structures, perhaps the most interesting is the skin-fold which enables the flying squirrels to parachute from tree to tree. The fur is generally short and soft, but it may be coarse, as in rats, or even spiny, as in spiny mice and porcupines. Very common are special glands which give a characteristic odor, as in the case of the muskrat.

To man the group is of considerable interest. Owing to their vegetarian habit many of the rodents are exceedingly destructive; squirrels destroy young trees by gnawing the bark, while rats, lemmings, and voles often ruin the crops throughout wide districts, being slaughtered by thousands in 'plague' years. On the other hand, beavers, marmots, chinchillas, hares, the American coypu, and others possess soft fur highly valued for garments and wraps, while garbage-feeders, such as rats, act as scavengers. See RAT; PLAGUE.

At the present day rodents are found all the world over, although their chief home is in S. America. Fossil remains indicate that they were plentiful even from early Tertiary times.

The order Rodentia falls into two great divisions—*Simplicidentata* with a single pair of incisors in the upper jaw, and *Duplicidentata* with two pairs. The former includes three suborders: (1) *Sciuromorpha*—squirrels, beavers, marmots, etc.; (2) *Myomorpha*—rats, mice, dormice, gerbils, jerboas, lemmings, voles, gophers, etc.; (3) *Hystricomorpha*–porcupines, chinchillas, cavies, agouties, capybara, etc. *Duplicidentata* includes only the sub-order *Lagomorpha* —rabbits, hares, and picas.

RODERIC (*d.* 711), 'The last of the Goths,' was Visigothic king of Spain, supplanting Witiza, whose sons, aided by Tarik, a Moor, defeated and slew R. at Guadalete. R.'s story was treated by Scott and Southey.

RODEZ (44° 21′ N., 2° 35′ E.), chief town, Aveyron, France, on Aveyron; ancient *Sagodunum*; cathedral; textiles. Pop. 15,600.

RODGERS, CHRISTOPHER RAYMOND PERRY (1819-92), an American naval officer, *b.* in Brooklyn, N.Y. He entered the Navy in 1833, as a midshipman, participated in the Mexican War, and during the Civil War, as commander, assisted in the Battle of Port Royal and in the attack on the defenses of Charleston, in 1863. He was made a rear-admiral in 1874, was then for two years Superintendent of the Naval Academy at Annapolis, and during 1878-80 in command of the Pacific Fleet.

RODGERS, JOHN (1812-82), an American naval officer, *s.* of John Rodgers (1771-1838), *b.* in Hartford County, Md. He entered the Navy as a midshipman in 1828 and during 1852-5 had command of an exploring expedition in the North Pacific and Arctic oceans. During the Civil War he commanded the Galena in the bombardment of Fort Darling. On June 17, 1863, commanding the monitor Weehawken, he engaged in battle the Confederate ironclad Atlanta and captured her. In 1870, while in command of the Asiatic Squadron, he was fired upon by Korean forts, whereupon he bombarded the forts, landed marines and captured them. After 1877 he was superintendent of the Naval Observatory in Washington, D.C.

RODGERS, JOHN (1771-1838), an American naval officer, *b.* in Harford County, Md. He entered the Navy as a midshipman in 1798, served during the War of 1812, and in 1814, in command of the new frigate Guerriere, aided in the defense of Baltimore. In 1823 he was Acting Secretary of the Navy Department.

RODGERS, JOHN AUGUST (1848), American rear-admiral, *b.* in Havre de Grace, Maryland; graduated at the U.S. Naval Academy in 1868, and rose by

promotion to be captain 1903; rear-admiral, 1908. Was in active service during the Civil War with Pacific squadron: torpedo service on Hartford, Juniata, Trenton, and others, 1868-80: Navy Yard, Washington, 1880-83: Ossipee, 1884-87: member of Steel Board, 1887-90; Pensacola, 1890-1901: Naval War College, 1892: Mianotomah, 1892-94: inspection duty, 1895-97: executive officer Indiana, 1897-99: assisted in the destruction of Cervera's fleet off Santiago, Cuba, July 1898, and was advanced five numbers for 'eminent and conspicuous service'; charge of the 6th Lighthouse District, 1904: Illinois 1904-6: inspector 3rd Lighthouse District, 1906-7: commandant Navy Yard at Puget Sound, Washington, 1908-10: retired July 1910. Commander of naval units at Harvard and instructor at Boston and Tuft colleges, 1918.

RODGERS, RAYMOND PERRY (1849), rear-admiral; *b.* Washington, D.C. He graduated from the U.S. Naval Academy in 1868, was commissioned ensign the following year, and passed through the regular grades of promotion to rear-admiral in 1908. From 1893 to 1897 he was U.S. naval attache to France and Russia, served in the Spanish-American war as executive officer of the *Iowa* and was advanced five numbers in rank for his part in the engagement in which Cervera's fleet was sunk. He saw service also in the Philippines and during the Boxer rebellion. He was president of the Naval War College in 1909 and retired in 1911.

RODIN, AUGUSTE (1840-1917), Fr. impressionist sculptor, of Paris; president, International Soc. of Painters, Sculptors, and Engravers; distinguished for busts and statues of overwhelming power, realism, and psychic perception; has also executed Biblical and symbolic groups; his *Victor Hugo listening to the Inner Voices* is perhaps his masterpiece; *The Burghers of Calais* (replica in London), *The Gate of Hell, War, The Man who Awakes,* bronze *St. John the Baptist,* in the Luxembourg (copy in S. Kensington Museum, London)

RODMAN, HUGH (1859), admiral, U.S. Navy, *b.* at Frankfort, Ky., son of Hugh and Susan Ann Barbour Rodman. He graduated from the United States Naval Academy in 1880, and after serving on various duties and stations and advancing through various grades he became an admiral in 1917 and in 1919 was made commanding admiral and commander-in-chief of the Pacific Fleet. In World War commanded battle-ship division.

RODNEY, CAESAR (1728-84), Revolutionary general; *b.* and *d.* Dover, Del. He was high sheriff of Kent County, Delaware, and a judge of the province in the colonial era, but became an early insurgent against the British colonial policy. As a member of the first Continental Congress, the assemblying of which was largely due to a speech he made at the Stamp Act Congress, he was a signer of the Declaration of Independence. In 1775 he toured his province to stir up independence sentiment and when the war came served under Washington as a brigadier-general in command of the Delaware militia. From 1777 to 1782 he was president of the State of Delaware.

RODNEY, GEORGE BRYDGES RODNEY, BARON (1718-92), Brit. admiral; admiral of the White, 1778; vice-admiral of Great Britain, 1781; destroyed Havre harbor, 1759; took Martinique 1761; cr. baronet, 1764; won victories of *Cape Finisterre* and *Cape St. Vincent,* and relieved Gibraltar, 1780; captured St. Eustachia, 1781; defeated Fr. fleet off Leeward Islands, 1782, his crowning victory.

RODOLPH. See RUDOLPH.

RODOSTO (41° N., 27° 31′ E.), seaport, European Turkey, on Sea of Marmora; ancient *Bisanthe* or *Rhoedestus.* Pop. 40,000.

RODRIGUEZ (19° 40′ S., 63° 25′ E.), island, dependency of Mauritius, in Ind. Ocean; area, 42 sq. miles; of volcanic formation; surface mountainous; chief town and port, Mathurin; R. was first visited by Portuguese, 1645, and has belonged to Britain since 1810; produces rice, cotton, sugar-cane, tobacco, fruits, vegetables, timber. Pop. 5,000.

ROE, CHARLES FRANCIS (1848), an American soldier, *b.* in New York. In 1868 he graduated from the United States Military Academy and in the same year commissioned a second lieutenant. He rose through the various grades to the rank of brigadier-general of the volunteers in 1898 and in that year was honorably discharged. Organized in 1889 Troop A, New York National Guard and was appointed major-general in 1898. He retired in 1912 on account of age.

ROE, EDWARD PAYSON (1838-88), Presbyterian clergyman and novelist; *b.* in Moodna, near New Windsor, New York; *d.* in Cornwall, New York. Educated at Williams, Auburn, and Union Theological Seminary, ordained Presbyterian minister, 1862. Chaplain in the

volunteer service 1865; pastor Highland Falls, 1874; then moved to Cornwall-on-the-Hudson, and engaged in raising small fruits and in writing novels. His works include *Barriers Burned Away*, 1877; *Opening of a Chestnut Burr*; *Driven Back to Eden*, 1882; *The Earth Trembled*, 1887; also three books on agriculture.

ROEBLING, JOHN AUGUSTUS, (1806-69), American bridge builder; *b.* in Mülhausen, Prussia; *d.* in Brooklyn. He came to the United States in 1831 and settled at Pittsburgh where he later manufactured iron and steel wire used in 1844-45 for the aqueduct over the Allegheny River at Pittsburgh. He moved his business to Trenton, N.J. in 1851, and began the suspension bridge over Niagara, and another over the Allegheny, and connected Cincinnati and Covington, 1868. Chief engineer of the Brooklyn Bridge 1868; he died from an injury to his foot and the work was completed by his son. Author *Long and Short Spans in Railroad Bridges*, 1869.

ROEBLING, WASHINGTON AUGUSTUS (1837-1917), American bridge builder; *s.* of above; *b.* in Saxonburg, Pa. Graduated at Renselaer Polytechnic Institute, Troy, New York in 1857. He served with the Union armies, 1861-65, and was brevetted lieut.-colonel, 1865. He worked with his father in bridge building, was his assistant on the Brooklyn Bridge and succeeded him as chief engineer on his death. Vice-president of the iron and steel rope and wire manufacturing firm of John A. Roebling and Son, Trenton, New Jersey.

ROE DEER, see under DEER FAMILY.

ROEMER, OLE (1644-1710), Dan. astronomer; prof. at Copenhagen Univ.; discovered velocity of light and invented accurate astronomical apparatus.

ROENTGEN RAYS. See RÖNTGEN RAYS.

ROERMOND (51° 12′ N., 5° 59′ E.), town, Limburg, Netherlands, at junction of Roer and Meuse cathedral; cloth manufactures. Pop. 15,000.

ROGATION DAYS, the Monday, Tuesday, and Wednesday before Ascension Day; these days are appointed for prayer and fasting.

ROGER I. (1031-1101), Count of Sicily; youngest of twelve sons of Tancred de Hauteville; divided Calabria with bro., Robert Guiscard, 1062; conquered Sicily, 1060-1101.

ROGER II. (1093-1154), king of Sicily; succ. his *f.*, Roger I., as Count of Sicily, 1101; Duke of Apulia and Calabria, 1127; conquered Capua, Amalfi, and Naples, thus establishing later realm of the Two Sicilies, which he made civilized Norman state; crowned, 1130; established over-lordship over Arabs of Africa.

ROGER (*d.* 1139), Norman priest; entered service of Henry I., who created him bp. of Salisbury; became very powerful; a worldly man.

ROGER DE COVERLEY, SIR, the type of an English country gentlemen as portrayed by Steele and Addison. He was the chief character in the club professing to write the *Spectator*. The dance which was invented by the great-grandfather of Roger de Coverley, or Roger of Cowley, near Oxford, is named after him.

ROGER OF WENDOVER (*d. c.* 1236), a chronicler, was a monk of St. Albans. His chief work is the *Flores Historiarum* (edited by H. G. Hewlett, 1886-89).

ROGERS, HENRY HUDDLESTONE (1840-1909), capitalist and philanthropist, *b.* in Fairhaven, Mass.; educated at local schools he became connected with the Standard Oil Company, rose to be vice-president and one of the principal stockholders. President of the Amalgamated Copper Corporation in 1901, he was director of U.S. Steel Corporation, National Transit Company and other industrial organizations. His public gifts included schools and memorial churches, and to his birthplace, Fairhaven, he donated the Millicent Library and town water-works.

ROGERS, HENRY WADE (1853), American lawyer; *b.* in Holland Patent, New York. Graduated at University of Michigan, 1874; bar, 1877; professor in Law School, University of Michigan, 1889; dean, 1885-90; president Northwestern University, 1890-1901; of Yale Law School, 1901-13. United States Circuit judge, 1913. Author *Expert Testimony*, 1883; *Introduction to Constitutional History as seen in American Law*, 1889, and others.

ROGERS, JAMES EDWIN THORROLD (1823-90), Eng. economist; *b.* in West Meon, Hampshire, *d.* in Oxford. Educated at King's College, London, and Oxford. Ordained in the Established Church and curate of St. Philip's, Oxford. Resigned in 1870 because opposed to the Tractarian movement. Professor of statistics and economic science, Kings College, 1879; elected professor of political economy, Oxford

for five years, failed re-election until 1888. In 1880 member of parliament for Southwark, in 1885, for Bermondsey; lost seat in 1886 for backing Gladstone's Home Rule Bill. His chief work *History of Agriculture and Prices in England.*

ROGERS, JOHN (1829-1904), American sculptor. He was noted for his small groups, homely and unconventional. His larger works include statutes of Gen. Reynolds and Abraham Lincoln.

ROGERS, JOHN (1866), American surgeon, *b.* in New York City. He graduated from Yale (A.B.) 1887; Ph.B. 1888, and Columbia Medical School, M.D., 1891. Instructor of clinical surgery, 1898; professor, 1909; Cornell University Medical College. Attendant surgeon at Bellevue and Booth hospitals. Fellow of the American College of Surgeons. Member of the New York Academy of Medicine., and of the New York Surgical Society, A.M.A. Delta Kappa Epsilon.

ROGERS, RANDOLPH (1825-92), an American sculptor, *b.* in Waterloo, New York. He studied art in Europe for two years. Returning to New York, he had a studio there for five years but in 1855 returned to Rome. Among his works are the bronze doors of the National Capital at Washington, D.C, and memorial monuments in Richmond, Detroit, and Providence.

ROGERS, ROBERT (1727-1800), Anglo-American colonel and author; *Rogers' Rangers* were distinguished in Canada against French, 1755-60; mistrusted by nationalists and fought for Britain in War of Independence.

ROGERS, ROBERT WILLIAM (1864), an American orientalist, *b.* at Philadelphia, Pennsylvania. In 1886 he graduated from the University of Pennsylvania. He was instructor of Hebrew at various colleges. Author of: *The Religion of Babylonia and Assyria*, 1909; *Old Testament Lesson—A Lectionary*, 2 volumes, 1921; *Great Characters of the Old Testament*, 1920.

ROGERS, SAMUEL (1763 - 1855), Eng. poet; *b.* Stoke-Newington; entered his father's bank, 1784; became head of the firm, 1793; famous as poet in his own day, and was ranked by Byron above Wordsworth and Coleridge, but his works are unread to-day, and even *The Pleasures of Memory* is but a name. His home at 22 St. James' Place, London, was noted for its elegance, and the witty company that visited it.

ROGERS, SAMUEL LYLE (1859), a director of tho census, *b.* in Franklin, Macon County, North Carolina and educated in Franklin High School. Began in the mercantile business at the age of nineteen and was clerk in the Superior Court, Macon County from 1882-93. He was collector of internal revenue, Western District of North Carolina, 1895-97. A member of the State Corporation Commission of North Carolina, 1899-1911 and was appointed director of the census by President Wilson in 1915.

ROGET, PETER MARK (1779-1869), a physician, *b.* in London. He studied at Edinburgh and Manchester, in which latter city he held several appointments, notably as physician to the lunatic asylum. Among his works are: *A Thesaurus of English Words and Phrases*, and *Animal and Vegetable Physiology.*

ROGIER, CHARLES LATOUR (1800-85), Belg. statesman and author; aided revolution, 1830; member of provisional government; Minister of Interior, 1832-34; laid down railroads; Minister of Public Works, 1840-41; Minister of Interior, 1847-52, 1857-61; avoided revolution, 1848, by concessions; Minister of Foreign Affairs, 1861-68; freed navigation of Scheldt.

ROGUE. See VAGRANCY.

ROHAN, HENRI, DUC DE (1579-1638), Fr. Huguenot commander; obtained for Huguenots Treaty of Montpellier, 1623, and became marshal; Huguenots crushed by Richelieu, despite warfare waged by R. and younger bro., Soubise, 1625-29; wrote *Memoires*, famous book *Parfait capitaine*, etc.

ROHAN, LOUIS RENÉ ÉDOUARD, CARDINAL DE (1734-1803), Fr. courtier; notorious for the Diamond Necklace Affair. The necklace, originally made for Madame du Barry, was priced at $400,000; R., duped by De Lamotte, an adventuress, believed that the queen wanted it and became security; De Lamotte and her husband sold the separate stones; the theft discovered, De Lamotte was branded, her husband fled to England, R. was tried and acquitted by the Parlement of Paris; becoming a popular hero R. was elected to the States-general, 1789.

ROHILKHAND (28° 50′ N., 78° 40′ E.), division, United Provinces, India. Pop. 5,500,000. Chief town, Bareilly.

ROHLFS, FRIEDRICH GERHARD (1831-96), Ger. explorer and author of books of travel; first European to visit oasis of Touat in Sahara, 1864; explored Kamar, 1866; Siwa, 1869; Libyan Desert, 1873-74; oases of Sokna and Koufra, 1878; consul at Zanzibar, 1885.